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ARBORETUM ET FRUTICETUM BRITANNICUM;

OR,

THE TREES AND SHRUBS OF BRITAIN,

Native and Foreign, Hardy and Half-Hardy,

PICTORIALLY AND BOTANICALLY DELINEATED,

AND SCIENTIFICALLY AND POPULARLY DESCRIBED;

WITH

THEIR PROPAGATION, CULTURE, MANAGEMENT,

AND USES IN THE ARTS, IN USEFUL AND ORNAMENTAL PLANTATIONS, AND IN

LANDSCAPE-GARDENING;

PRECEDED BY A HISTORICAL AND GEOGRAPHICAL OUTLINE OF THE TREES AND SHRUBS OF TEMPERATE CLIMATES THROUGHOUT THE WORLD.

BY J. C. LOUDON, F.L. & H.S. &c.

AUTHOR OF THE ENCYCLOPÆDIAS OF GARDENING AND OF AGRICULTURE.

IN EIGHT VOLUMES:

FOUR OF LETTERPRESS, ILLUSTRATED BY ABOVE 2500 ENGRAVINGS; AND FOUR OF OCTAVO AND QUARTO PLATES.

VOL. III.

FROM *ASCLEPIADA'CEÆ* P. 1257., TO CORYLA'CEÆ, P. 2030., INCLUSIVE.

SECOND EDITION.

LONDON:

HENRY G. BOHN, YORK STREET, COVENT GARDEN.

1854.

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CONTENTS OF VOL. III.

The Roman numerals refer to the General Table of Contents, Vol. I. p. xvii. to cliii., where the species and varieties, with all their synonymes, will be found systematically arranged; the first column of Arabic figures to the pages of the text in this volume, and the second to those of the supplementary matter contained in Vol. IV.

The names of the half-hardy and suffruticose orders and genera are in small type.

ALPHABETICAL INDEX TO VOL. III.

ARBORETUM ET FRUTICETUM BRITANNICUM.

CHAP. LXXVIII.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS OF THE ORDER *ASCLEPIADA'CEÆ*.

GENUS I.

PERI'PLOCA *L.* THE PERIPLOCA. *Lin. Syst.* Pentándria Digýnia.

Identification. R. Br. in Mém. Wern. Soc., 1. p. 57.; Lindl. Nat. Syst. Bot., edit. 2., p. 305.; Don's Mill., 4. p. 163.
Synonymes. Periploca *Fr.*; Schlinge, *Ger.*
Derivation. From *periplekō*, to wrap about; in allusion to the twining stems.

Gen. Char., &c. *Corolla* rotate. *Throat* furnished with 5 awned scales, which alternate with the segments of the corolla. *Filaments* distinct. *Anthers* cohering, bearded on the back; pollen masses applied to the dilated tops of the corpuscles of the stigma, solitary, or composed of 4 confluent ones. *Stigma* almost mutic. *Follicles* cylindrical, much divaricate, smooth. *Seeds* comose. (*Don's Mill.*, iv. p. 163.) — The hardy species are natives of the south of Europe, the north-west of Asia, or the north of Africa. Twining glabrous shrubs. Leaves opposite, shining. Flowers subcorymbose, interpetiolar; of easy culture in common soil, and propagated by cuttings of the root or shoots, or by layers.

⅄ 1. P. GRÆ'CA *L.* The Greek Periploca.

Identification. Lin. Sp., p. 309.; Don's Mill., 4. p. 163.; Lodd. Cat., ed. 1836.
Synonyme. P. maculàta *Mœnch*, *Schmidt Baum.*, 1. t. 46., *Du Ham. Arb.*, 2. p. 104. t. 21., *Hort. Angl.*, t. 15.
Engravings. Jacq. Misc., 1. p. 11. t. 1. f. 2.; Fl. Græc., t. 949.; Bot. Reg., t. 803.; Schkuhr Handb., t. 53.; and our *figs.* 1087. and 1088.

Spec. Char., &c. Leaves varying from ovate to lanceolate. Corymbs on long peduncles. Flowers hairy inside. Branches brown. Segments of corolla linear, rounded at the apex, greenish outside, and brownish inside, and clothed with copious short hairs. Leaves deciduous, 3—4 in. long. (*Don's Mill.*, iv. p. 163.) A hardy twining shrub, a native of the south of France, and of Bithynia, found also about Bursa, and on Mount Athos; flowering in July and August. It was introduced in 1597, and is frequent in gardens. The remarkable colour and rich velvety appearance of the flowers, the elegant form of the leaves, and the facility with which the plant can be made to cover an extensive space, render it useful for arbours, &c.; but it is mentioned in the *N. Du Hamel* that the odour of the flowers


1087


1088

is considered unwholesome, and even dangerous, to those who are long exposed to it. In the *Gard. Mag.*, vol. ix. p. 586., Mr. Godsall, nurseryman, of Hereford, mentions that he has seen the pavement of an arbour over which a plant of Períploca græ'ca was trained, and in full flower, literally covered with dead house-flies, which appeared to have fallen from the blossoms, apparently killed by some deleterious property contained in them. The capability of extension of this plant is proved by one in the Cambridge Botanic Garden having been trained, by means of a jack chain, as high as the branches of one of the trees of *Sophòra* japónica, mentioned in p. 565. as being 50 ft. high, and which was clear of branches to a considerable height. When twined round a tree, the periploca forms a deep identation in the bark. (See *Mag. Nat. Hist.*, vol. vi. p. 331.) Price of plants, in the London nurseries, 1*s.* 6*d.* each; at Bollwyller, 60 cents; and at New York, 37½ cents.

3 2. P. ANGUSTIFO'LIA *Labill.* The narrow-leaved Periploca.

Identification. Lab. Pl. Syr., dec. 2. p. 13. t. 7.; Don's Mill., 4. p. 163.
Synonymes. P. rígida *Viv.*; P. lævigàta *Vahl.*
Engravings. Labill. Pl. Syr., dec. 2. p. 13. t. 17.; and our *fig.* 1089.
Spec. Char., *&c.* Leaves veinless, narrow-lanceolate, glabrous, persistent. Cymes trichotomous. Flowers purplish inside, pale yellow beneath and round the mouth, with a white spot in the middle. Leaves 1 in. long. (*Don's Mill.*, iv. p. 163.) A twining shrub, a native of Tunis, on Mount Schibel Jsekel; and of the Island of Lampedosa, at the sea side, near Laodicea. An ornamental plant, which was introduced in 1800, and is quite as hardy as P. græ'ca. It is rare in British collections.


1089

P. lævigàta Ait.; *P.* punicæfòlia *Cav. Icon.*, 3. t. 217.; is a twining evergreen shrub, a native of the Canary Islands, which was introduced in 1779; and, though generally kept in green-houses, would live through the winter against a south wall, with protection.

The half-hardy species of Períploca, being deciduous, may be preserved through the winter with much less care than many other tender trees and shrubs.

CHAP. LXXIX.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS BELONGING TO THE ORDER BIGNONIA'CEÆ.

THE genera belonging to this order which contain hardy species are, Bignònia, *Técoma*, and *Catálpa*, which are thus distinguished: —

BIGNO'NIA Tourn. Calyx 5-toothed. Dissepiment of the fruit parallel.
TE'COMA Juss. Calyx 5-toothed. Dissepiment of the fruit contrary.
CATA'LPA Juss. Calyx 2-parted. Dissepiment of the fruit parallel.

GENUS I.

BIGNO'NIA Tourn. THE TRUMPET FLOWER. *Lin. Syst.* Didynàmia Angiospérmia.

Identification. Tourn. Inst., 72.; Juss. Gen., 139.; Gærtn. Fruct., t. 52.; H. B. et Kunth Nov. Gen. Amer., 3. p. 132.; D. Don in Edin. Phil. Journ.; Lindl. Nat. Syst. Bot., edit. 2., p. 282.; Don's Mill., 4. p. 216.
Synonymes. Bignònia sp. of Lin. and others; Bignone, *Fr.*; Trompetenblume, *Ger.*
Derivation. So named by Tournefort, in compliment to the *Abbé Bignon*, librarian to Louis XIV.

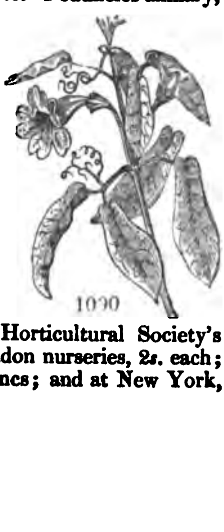
Gen. Char., *&c.* *Calyx* campanulate, 5-toothed, rarely entire. *Corolla* with a short tube, a campanulate throat, and a 5-lobed bilabiate limb. *Stamens* 4, didynamous, that is, 2 long and 2 short; with the rudiment of a fifth. *Lobes* of anthers divaricate. *Stigma* bilamellate. *Capsule* silique-formed, 2-celled;

having the dissepiment parallel with the valves. *Seeds* disposed in 2 rows, imbricate, transverse, with membranous wings. (*Don's Mill.*, iv. p. 216.) — Usually climbing shrubs, furnished with tendrils, rarely erect trees or shrubs. Leaves opposite, simple, conjugate, trifoliolate, digitate, or pinnate. Flowers axillary and terminal, usually panicled. Corollas trumpet-shaped, white, yellow, orange-coloured, purple, violaceous, or rose-coloured. The only hardy species is a subevergreen climber, a native of North America; and, like all the plants of this order, easily propagated by cuttings of the roots, or shoots.

⅄ ⅄ 1. B. CAPREOLA'TA *L.* The tendriled Bignonia, *or Trumpet Flower.*

Identification. Lin. Sp., 870.; Hort. Cliff., 317.; Don's Mill., 4. p. 217.
Engravings. Bot. Mag., t. 864.; Breyn. Icon., 33. t. 25.; Du Ham. Arb., 1. p. 104. t. 40.; Bocc. Sic., 31. t. 15. f. 31.; Zan. Hist., 74. f. 2. ed. 2. 49. t. 33.; and our *fig.* 1090.

Spec. Char., &c. Climbing. Leaves conjugate; leaflets cordate-oblong; lower ones simple. Tendrils small, trifid; the lobes bifurcate. Peduncles axillary, 1-flowered, crowded. Calyx entire. Corollas reddish yellow. Follicles flattened, 1 ft. long. (*Don's Mill.*, iv. p. 217.) A climbing shrub, a native of North America, in the more southern parts; flowering in June and July. The follicles are said, as above, to be a foot long; but, on an open wall, in the Horticultural Society's Garden, they do not exceed 6 in. or 8 in. It was introduced in 1710, and forms a very ornamental wall climber in British gardens. This is an excellent plant for covering dead walls, from its great capability of extension, its being subevergreen, and the singular shape of its large and handsome leaflets. It requires a sheltered situation, and favourable exposure, in order to flower freely. The plant of this species in the Horticultural Society's Garden ripens seeds. Price of plants, in the London nurseries, 2*s.* each; at Bollwyller, where it is a green-house plant, 4 francs; and at New York, 50 cents.



1090

GENUS II.



TE'COMA Juss. THE TECOMA. *Lin. Syst.* Didynàmia Angiospérmia.

Identification. Juss. Gen., p. 139.; R. Br. Prod., 471.; H. B. et Kunth Nov. Gen. Amer., 3. p. 142.; Lindl. Nat. Syst. Bot., 2d edit., p. 282.; Don's Mill., 4. p. 223.
Synonyme. Bignònia sp. of Lin. and others.
Derivation. From *Tecomaxochitl*, the Mexican name of one of the species.

Gen. Char., &c. *Calyx* campanulate, 5-toothed. *Corolla* with a short tube, and a campanulate throat; limb 5-lobed, bilabiate. *Stamens* 4, didynamous; that is, 2 long and 2 short; with the rudiment of a fifth sterile filament. *Stigma* bilamellate. *Capsule* silique-formed, 2-celled, having the dissepiment contrary to the valves. *Seeds* disposed in 2 rows, imbricate, winged, transverse. (*Don's Mill.*, iv. p. 223.) — The only hardy species yet introduced is a deciduous climbing shrub.

⅄ 1. *T.* RADI'CANS *Juss.* The rooting-*branched* Tecoma, *or Trumpet Flower.*

Identification. Juss. Gen., p. 139.; Don's Mill., 4. p. 225.
Synonymes. Bignònia radìcans *Lin. Sp.*, 871., *Hort. Cliff.*, 317., *Ups.*, 178., *Gron. Virg.*, 73., *Mill. Icon.*, t. 65., *Du Ham. Arb.*, 1. p. 103. t. 1., *Sab. Hort.*, 2. t. 84., *Du Roi Harbk.*, 1. p. 116., *Wangenh. Amer.*, 68. t. 26. f. 53., *Willd. Arb.*, 47., *Curt. Bot. Mag.*, t. 485., *Riv. Mon.*, p. 101., *Mor. Hist.*, 3. p. 612. f. 15. t. 3. f. 1., *Corn. Can.*, 102. t. 103.; Bignònia radìcans màjor *Hort.*, *Gelsèminum* Clématis *Barrel. Icon.*, 59.; Bignònia fraxinifòlia *Catesb. Car.*; Jasmin de Virginie, *Fr.*; Wurzeln Bignonia, *Ger.*; Eschenblädige Bignonia, *Dutch.*
Derivation. Wurzeln is, simply, rooting; and Eschenblädige, ash-leaved.
Engravings. Bot. Mag., t. 485.; and our *fig.* 1091.

Spec. Char., &c. Climbing, glabrous. Branches rough, rooting. Leaflets 9, ovate, acuminated, coarsely serrated. Racemes terminal, corymbose, on long peduncles. Tube of corolla 5 times longer than the calyx. (*Don's Mill.*, iv. p. 225.) A beautiful hardy climber, which fixes itself to trees or walls by its roots, like ivy. The flowers are produced at the ends of the shoots, in large bunches; and have long swelling tubes, shaped somewhat like a trumpet. The corolla is large, scarlet, and orange-coloured. It is a native of Carolina, Florida, and Virginia, and flowers in August and September. It was introduced in 1640, and is frequent in British gardens, where it grows vigorously, producing tufts of leaves and fine flowers, abundantly at the extremity of the branches, but being rather apt to become naked below. One of the finest specimens of this plant in Europe is that trained against the Palace Pitti at Florence, which, when we saw it in 1819, was, if our recollection does not deceive us, upwards of 60 ft. high, and extending proportionably in width. It is quite hardy in England; but in the north of France they cover the trunk with straw during winter, for a few years, till it has become perfectly ligneous. Price of plants, in the London nurseries, 50*s.* per hundred; in pots, 1*s.* 6*d.* each; seeds, 1*s.* 6*d.* per ounce: at Bollwyller, 50 cents, or 15 francs per hundred: and at New York, 50 cents.



1091

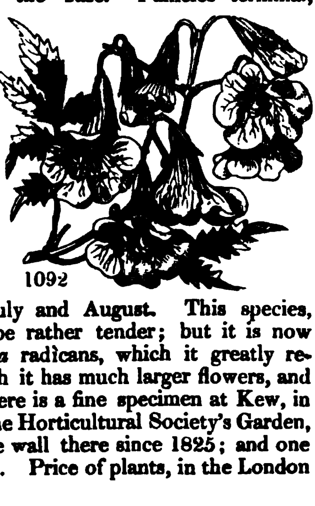
Variety.

♣ T. *r.* 2 *major* Hort. has the flowers larger and of a paler scarlet; the leaves, also, differ considerably, both in size and shape. It is a climbing shrub, a native of Carolina, which flowers in August, and was introduced in 1724.

♣ 2. *T.* GRANDIFLO'RA *Swt.* The great-flowered Tecoma.

Identification. Sweet's Hort. Brit., p. 14.; Don's Mill., 4. p. 225.; Lodd. Cat., ed. 1836.
Synonymes. Bignònia grandiflòra *Thunb. Fl. Jap.*, 253., *Blum. Bijdr.*, 778.; B. chinénsis *Lam. Dict.*, 1. p. 424.; Rjotsjo *Kæmpf. Amæn.*, p. 856., *Banks Icon. Kæmpf.*, t. 21.; Incarvìllea grandiflòra *Spreng. Syst.*, 2. p. 836.; Tung-von-fa, *Chinese.*
Engravings. Banks Icon. Kæmpf., t. 21.; and our *fig.* 1092.

Spec. Char., &c. Slightly scandent, glabrous. Leaflets 7—9, ovate, acuminated, coarsely serrated, attenuated at the base. Panicles terminal, pendulous. Calycine segments lanceolate, length of the tube of the corolla. Branches rooting. Young shoots spotted with dark purple. Leaves 6—10 in. long, Petioles marginate. Flowers pendulous, forming terminal cross-armed panicles, large, of a tawny orange colour on the outside, and of a tolerably bright reddish orange colour inside, with brighter streaks. Nectary a glandular crenated ring. Anterior lobe of stigma recurved. (*Don's Mill.*, iv. p. 225.) A climbing shrub, a native of China and Japan. Introduced in 1800, and flowering in July and August. This species, when first introduced, was thought to be rather tender; but it is now found to be almost as hardy as *Técoma* radìcans, which it greatly resembles, but is of a slighter habit, though it has much larger flowers, and is altogether a very splendid plant. There is a fine specimen at Kew, in front of one of the stoves; a large one in the Horticultural Society's Garden, which has stood against the conservative wall there since 1825; and one against the wall in the Hackney arboretum. Price of plants, in the London nurseries, 2*s.* 6*d.* each.



1092

App. I. *Half-hardy ligneous Plants belonging to the Order Bignoniàceæ.*

Bignònia crucígera Plum. Icon., t. 58., has the leaflets large; the flowers yellow, and whitish beneath; and the follicles, or pods, 1 ft. long. A transverse section of the stem represents a cross; and hence the trivial name. It is a climbing shrub, a native of Virginia, Mexico, &c.; and was introduced in 1759. Perhaps it might be grafted or inarched on B. capreolàta; and, if so, it might then be tried against a conservative wall.



1093



1094

Técoma *austràlis* R.Br.; Bignònia Pandòræ Vent., Bot. Mag., t. 865.; and our *fig.* 1093.; has the flowers a pale red, with a dark purple bearded throat. It is a climbing shrub, a native of New Holland, within the tropics, and of New South Wales. It was introduced in 1793; and, in green-houses, its flowers have a very fine appearance. It is tolerably hardy, and would succeed against a conservative wall in favourable situations.

T. *capénsis* Lindl.; Bignònia capénsis *Thunb. Bot. Reg.*, t. 1117.; and our *fig.* 1094.; is a Cape shrub, with orange scarlet flowers, 3 in. long. It is tolerably hardy; and, by grafting on *T.* radicans, might, in all probability, live against a conservative wall. In the warmest parts of Devonshire, we are informed, it stands out without any protection at all.

Genus III.



CATA'LPA Juss. The Catalpa. *Lin. Syst.* Diándria Monogýnia.

Identification. Juss. Gen., 138., ed. Usteri, p. 155.; Spreng. Gen., 1. p. 25.; Sims Bot. Mag., t. 1094.; Schkuhr Handb., t. 175.; Lindl. Nat. Syst. Bot., 2d edit., p. 282.; Don's Mill., 4. p. 230.
Synonymes. Bignònia sp. of Lin. and others; Bignone Catalpa, *Fr.*; gemeine Trompetenblume, *Ger.*
Derivation. The Indian name of a species of Bignònia.

Gen. Char., &c. Calyx 2-parted. *Corolla* campanulate, with a ventricose tube, and an unequal 4-lobed limb. *Stamens* 5, 2 of which are fertile, and 3 of them sterile. *Stigma* bilamellate. *Capsule* silique-formed, long, cylindrical, 2-valved. *Dissepiment* opposite the valves. *Seeds* membranously margined, and pappose at the base and apex. (*Don's Mill.*, iv. p. 230. — Trees, with simple leaves, opposite, or disposed 3 in a whorl. Flowers terminal, panicled.

¥ 1. *C. SYRINGÆFO'LIA Sims.* The Lilac-*like*-leaved Catalpa.

Identification. Sims Bot. Mag., t. 1094.; Schkuhr Handb., t. 175.; Don's Mill., 4. p. 230.; Lodd. Cat., ed. 1836.
Synonymes. Bignònia Catálpa Lin. Sp., 868., Willd. Sp., 3. p. 289.; Wangenh. Amer., p. 58. t. 20. f. 45.; *Catálpa* bignonioìdes Walt. Fl. Car., p. 64.; *C.* cordifòlia *Nut. Gen. Amer.*, 1. p. 10., *Du Ham. Arb.*, 1. p. 104. t. 41., *Catesb. Car.*, 1. p. 49. t. 21., *Lin. Hort. Cliff.*, 317.; Bois Shavanon, Catalpa de l'Amérique, *Fr.*; Trompeten-baum, *Ger.*; Catalpa-boom, *Dutch.*
Derivation. The French of Upper Louisiana call this tree Bois Shavanon, from its being found in abundance on the banks of the river *Shavanon*, now called the Cumberland. *Catalpa* is supposed to be a corruption of *Catawba*, an Indian tribe that formerly occupied a great part of Georgia and the Carolinas.
Engravings. Schmidt Baum., 1. t. 14.; Bot. Mag., t. 1094.; Schkuhr Handb., t. 175.; and the plates in our last Volume.

Spec. Char., &c. Leaves cordate, flat, 3 in a whorl, large and deciduous. Branches strong. Panicles large, branchy, terminal. Corollas white, speckled with purple and yellow. (*Don's Mill.*, iv. p. 230.) A deciduous tree, a native of North America. Introduced in 1726, and flowering in July and August. The seed-pods are remarkably long, narrow, and horny. The leaves come out very late, and the flowers appear in August. The tree thrives best near the banks of rivers; but, in some situations, it is very liable to die off by large limbs at a time. The branches dye wool a kind of cinnamon colour. This beautiful tree is a native of North America, where it is found on the banks of rivers in the upper part of the Carolinas, Georgia, and the Floridas; though, as Michaux observes, it is remarkable that it does not exist in the lower part of these provinces. "In these

southern regions," says Michaux, "it frequently exceeds 50 ft. in height, with a diameter of from 18 in. to 24 in. It is easily recognised by its bark, which is of silver grey, and but slightly furrowed; by its ample leaves, and by its wide-spreading head, disproportioned in size to the diameter of its trunk. It differs from other trees, also, in the fewness of its branches." (*N. Amer. Sylva*, ii. p. 64.) The catalpa is a tree of rapid growth, and its timber is remarkably light, of very fine texture, and brilliant when polished: its colour is of a greyish white; and, when properly seasoned, it is very durable. If a portion of the bark of this tree be removed in spring, "a venomous and offensive odour is exhaled." The bark is said to be tonic, stimulant, and more powerfully antiseptic than the Peruvian bark; and the honey collected from its flowers to be poisonous, and analogous in its effects to that made from the flowers of *Gelsèmium* nítidum. The catalpa is generally propagated by seeds, which are imported from America; but it will grow readily by cuttings of the root; and, of course, plants so raised will flower much sooner than those which are raised from seed. The tree is of rapid growth till it attains the height of 20 ft., which, in deep free soil, in the neighbourhood of London, it does in 10 years. Seedling plants begin to flower, under favourable circumstances, in 12 or 15 years; and, in soils and situations where the wood is well ripened, they continue flowering every year, making a splendid appearance, not only from the large size and lively colour of the flowers, which are white, marked with purple and yellow spots, but from the fine pale green of its very large leaves, which are of a different shade of green from those of almost every other tree; the nearest approach to it being that of the leaves of *Negúndo f*raxinifòlium. In fine seasons, the flowers are succeeded by seed-pods, which somewhat resemble those of the common cabbage, but on a large scale; being frequently 2 ft. long, and curved upwards so as to resemble horns.

Statistics. Catálpa syringæ*fòlia in the Environs of London.* At Kenwood, 40 years planted, 40 ft. high; diameter of trunk 1 ft. 5 in., and that of the head 35 ft.; head irregular; in sandy loam on clay. At Fulham Palace, 150 years planted, and 25 ft. high; diameter of the trunk 2 ft., and of the head 20 ft. At Syon, the tree figured in our last Volume, 52 ft. high; diameter of the trunk 3 ft., and that of the space covered by the branches 50 ft. At Kensington Gravel Pits, in the grounds of S. C. Hall, Esq., 30 ft. high; diameter of the trunk 1 ft., and of the head 40 ft.; on gravelly soil; and flowering abundantly every year. At Muswell Hill, 31 ft. high, with a head 30 ft. in diameter. In the Mile End Nursery, 35 ft. high.

Catálpa syringæ*fòlia South of London.* In Devonshire, at Luscombe, 19 years planted, and 27 ft. high; diameter of trunk 11 in., and that of the space covered by the branches 24 ft.; estimated height, in 10 years, 15 ft.; in loam on gravel. In Kent, at Cobham Hall, 30 years planted, and 30 ft. high, diameter of trunk 2 ft. 3 in., and that of the head 35 ft.; at Eastwell Park, 50 ft. high. In Wiltshire, at Longleat, 65 years planted, and 35 ft. high, diameter of the trunk 2 ft. 5 in., and of the head 37 ft.; at Wardour Castle, 50 years planted, and 30 ft. high; at Longford Castle, 25 years planted, and 30 ft. high.

Catálpa syringæ*fòlia North of London.* In Bedfordshire, at Ampthill, 38 years planted, and 30 ft. high; diameter of the trunk 2 ft., and of the head 40 ft. In Berkshire, at White Knights, 25 years planted, and 30 ft. high. In Buckinghamshire, at Temple House, 35 years planted, and 27 ft. high. In Cheshire, at Eaton Hall, 13 years planted, 14 ft. high. In Essex, at Hylands, 10 years planted, 21 ft. high: at Witham, two trees, from 40 to 50 years planted; one with a trunk free from branches to the height of 17½ ft., and the other to the height of 19½ ft.; both have wide-spreading heads, and flower abundantly every year. In Gloucestershire, at Doddington, 20 years planted, and 20 ft. high. In Hertfordshire, at Cheshunt, 10 years planted, 18 ft. high. In Lancashire, at Latham House, 60 years planted, and 33 ft. high. In Oxfordshire, at Blenheim, several fine old trees, upwards of 30 ft. high, with heads from 30 ft. to 50 ft. in diameter. In Pembrokeshire, at Stackpole Court, 6 years planted, and 6 ft. high. In Suffolk, in the Bury Botanic Garden, 11 years planted, and 13 ft. high. In Warwickshire, at Combe Abbey, 20 years planted, and 10 ft. high. In Worcestershire, at Croome, 40 years old, 60 ft. high; at Hagley, 8 years planted, 8 feet high. In Yorkshire, in the Hull Botanic Garden, 8 years old, and 6 ft. high.

C. syringæ*fòlia in Scotland.* At Gosford House, 12 years planted, and 15 ft. high. In the Glasgow Botanic Garden, almost herbaceous, even under the shelter of a wall; a proof of the coldness and moisture of the autumnal months in that part of Scotland, so very different from the climate of the east coast.

C. syringæ*fòlia in Ireland.* In the Glasnevin Botanic Garden, 30 years old, and 16 ft. high, diameter of the trunk 12 in., and of the top 15 ft.; at Cypress Grove, 16 ft. high, diameter of trunk 14 in., and of the top 12 ft.; at Terenure, 8 years planted, and 7 ft. high. In Galway, at Cool, 25 ft. high.

Catálpa syringæ*fòlia in France.* In the Jardin des Plantes, 60 years planted, it is 40 ft. high, the diameter of the trunk 20 in., and that of the head 40 ft.; at Scéaux, 30 years planted, it is 50 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft.; in the Botanic Garden at Toulon, 36 years planted, it is 36 ft. high, with a trunk 1½ ft. in diameter; at Nantes, in the nursery of M. De Nerrières, 30 years planted, it is 29 ft. high, the diameter of the trunk 2 ft.; in the Botanic Garden at Avranches, 29 years planted, it is 89 ft. high, the diameter of the trunk 1 ft. 8 in., and of the head 20 ft.

Catálpa syringæ*fòlia in Germany.* In Hanover, at Schwöbber, it is 30 ft. high; in the Göttingen

Botanic Garden, 10 years planted, it is 16 ft. high. In Cassel, at Wilhelmshoe, 40 years planted, it is only 5 ft. high, with a trunk 8 in. diameter, the shoots being killed back every year by the autumnal frosts. In Austria, at Vienna, in the University Botanic Garden, 26 years planted, it is 40 ft. high, the diameter of the trunk 18 in., and that of the head 24 ft.; at Laxenburg, 20 years planted, it is 18 ft. high, the diameter of the trunk 6 in., and of the head 10 ft.; at Kopenzel, 25 years planted, it is 24 ft. high, the diameter of the trunk 2 in., and of the head 8 ft., against a wall; at Brück on the Leytha, 40 years planted, it is 34 ft. high, the diameter of the trunk 1½ ft., and of the head 24 ft. In Prussia, at Sans Souci, 20 years planted, it is 11 ft. high, the diameter of the trunk 4 in.; in the Pfauen-Insel, 9 years planted, it is 10 ft. high.

Catálpa syringæfòlia in Russia. At Petersburg and Moscow, it is a green-house plant; in the Government Garden at Odessa, in the Crimea, it forms a splendid tree, flowering every year, and sometimes ripening seeds; though in the winter of 1835, M. Descemet informs us, it was very much injured by frost.

Catálpa syringæfòlia in Italy. In various parts of Italy and the south of France, and particularly in the neighbourhood of Milan and Montpelier, the *Catálpa* is planted as a road-side tree, and along the avenues to country houses; where, with *Mèlia Azedaràch* and the tulip tree, and in some places, where the soil is moist, with Magnòlia acuminàta and other species, it forms a scene of splendour and beauty worthy of a climate so congenial to vegetation. In Lombardy, at Monza, 29 years planted, it is 24 ft. high; the diameter of the trunk 16 in., and that of the head 24 ft.

Commercial Statistics. Price, in the London nurseries, seedlings 5*s*. per 100; transplanted seedlings, from 2 ft. to 4 ft., from 25*s*. to 75*s*. per 100; single plants from 1*s*. to 2*s*.6*d*. each, according to their size; and seeds 2*s*. per oz. At Bollwyller, plants are from 1 franc to 1½ francs each, and 2 years' seedlings 15 francs per 100. At New York, plants are 50 cents each.

App. I. *Of the half-hardy ligneous Plants of the Order Bignoniàceæ.*

Eccremocárpus longiflòrus Humb. et Bonp. Pl. Æquin., 1. p. 229. t. 65., and our *fig.* 1095., is a climber, a native of Peru, with leaves abruptly tripinnate; and yellow flowers, which are produced in July and August. It was introduced in 1825, and is suffruticose rather than ligneous; but, preserved in a pit during the winter, and turned out into light rich soil in May, and trained against a wall with a southern aspect, it grows with extraordinary rapidity, flowers freely, and ripens seeds, from which, or by cuttings, it is readily propagated.

E. viridis Ruiz et Pav., Don's Mill., 4. p. 231., has green flowers and bipinnate leaves. It is a native of Peru, in woods; but has not yet been introduced.



1095



1096



1097

Calámpelis scàbra D. Don; Eccremocárpus scàber *Ruiz et Pav.*, *Bot. Reg.*, t. 939.; and our *figs.* 1096. and 1097. Introduced from Chili in 1824. Leaves bipinnate, with the leaflets alternate, obliquely cordate, ovate, serrated or entire. The calyx is green; the corolla scarlet, or of a deep orange red; and the capsule large and muricated. It requires exactly the same treatment as Eccremocárpus; and, where young plants cannot be preserved through the winter in a pit or green-house, they may be raised from seeds (which the plant ripens abundantly in the open air, in the neighbourhood of London), early in spring, in a hot-bed, and shifted from smaller pots to larger ones, so as to be ready to be turned out in the open ground about the end of May. In mild seasons, this species, and also Eccremocárpus longiflòrus, live through the winter with very little protection, and shoot up again in the spring. A plant of Calámpelis scàbra, in the Horticultural Society's Garden, has stood out against a wall in this way since 1830. Perhaps it may be objected to our introducing such plants as Eccremocárpus and Calámpelis, that they are not truly ligneous; and that, north of London, they require to be treated more as herbaceous summer climbers or conservatory plants, than as hardy ligneous ones. We readily admit that such plants as these form, as it were, the boundary of the ligneous kingdom; but still we think they are more woody than herbaceous, and that the same kind of garden culture which is applicable to ligneous plants is the best adapted for them. Besides, in the south of England, the stems of the species of both these genera assume a decidedly more ligneous character than they do in the climate of London, and the plants endure in the open air, against a wall, for several years.

CHAP. LXXX.

OF THE HALF-HARDY LIGNEOUS OR SUFFRUTICOSE PLANTS BELONGING TO THE ORDER COBŒA`CEÆ.

Cobæ'a scándens Cav. Icon. Rar. 1. p. 11. t. 16., N. Du Ham., 4. t. 50., and our *fig.* 1098., is a tendriled climber, well known for the rapidity of its growth, the fine glaucous green of its smooth leaves and shoots, and the beauty of its large, solitary, axillary, nodding flowers, with bell-shaped violet or purple corollas, and its large, oval, pendent fruit. Plants should either be raised in autumn, and preserved in a pit, and turned out in spring (which is the general practice about London), or they may be sown in spring, and brought forward in a hot-bed. In mild winters, plants, in dry soil, against a conservative wall, may be preserved alive by covering them with mats. A plant of Cobæ'a scándens against the veranda at the Castle Inn at Slough, in 1806, is said to have extended its shoots upwards of 100 ft., on each side of the root, in one season. Astonishing effects might be produced by this plant in a single season, if it were thought desirable to incur a little extra expense. By preparing a large mass of turfy loam well enriched with leaf mould, or thoroughly decomposed manure, and by mixing this mass with a quantity of small sandstones, as recommended by Mr. M'Nab for the culture of the genus *Erica*, a large fund of nourishment would be produced. Now, in order that this nourishment might be rapidly imbibed by the roots, it would be necessary to supply it with bottom heat early in the season, and with liquid manure from a surrounding trench, three parts filled with that material, during the whole summer. A plant so treated would cover several thousand square feet of surface, either of wall, roof, or of the open ground, in one season.


1098

CHAP. LXXXI.

OF THE HARDY AND HALF-HARDY SUFFRUTICOSE PLANTS BELONGING TO THE ORDER CONVOLVULA`CEÆ.

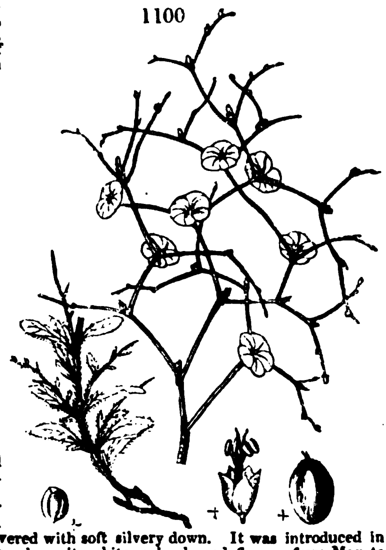
There are a few species of Convólvulus which are technically considered shrubby; and, though for all practical purposes they may be treated as herbaceous plants, we shall, for the sake of those who wish to gather every thing into an arboretum that can be included in it, here notice two or three species.

✠ *Convólvulus Dorýcnium* L., Fl. Græc., t. 200., and our *fig.* 1100., is a native of the Levant, and is common on the road sides near Corinth, where it forms a little bush about the height of 1½ ft., producing its fine rose-coloured flowers in


1099

June and July. It was introduced in 1806, and is occasionally met with in collections. It is suitable for rockwork.

1100



✠ 2. C. *Cneòrum* L., Fl. Græc., t. 200., and our *fig.* 1099., is a native of Spain, Crete, &c., with a shrubby-branched stem, and the whole plant covered with soft silvery down. It was introduced in 1640; grows to the height of 2 ft. or 3 ft.; and produces its white and pale red flowers from May to September. It is about as hardy as Cneòrum tricóccum (see p. 560.).

C. *scopàrius* L., and C. *flòridus* L., are natives of the Canaries, where they form trailing shrubs, from 1 ft. to 3 ft. in height; and they might probably be treated as half-hardy.

CHAP. LXXXII.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS BELONGING TO THE ORDER BORAGINA'CEÆ.

ꝏ. *Lithospérmum fruticòsum* L. (*Garid. Aix.*, p. 68. t. 15.) is a native of the south of Europe and north of Africa, where it forms a shrub from 1 ft. to 3 ft. high, producing its blue flowers in May and June. It was introduced in 1683, but is not common in collections.

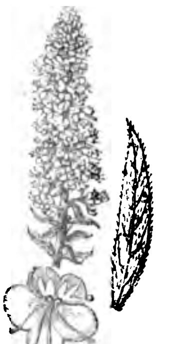
ꝏ. L. *fruticòsum màjus* Lehm.; *L.* rosmarinifòlium *Tenore*, *Bot. Reg.*, t. 1736.; and our *fig.* 1101. is a native of Naples, and on the mountains of the Grecian Archipelago.



1101

ꝏ. L. *prostràtum* Lois. Fl. Gall., 1. p. 105. t. 4., is a prostrate suffruticose plant, a native of France. Introduced in 1825. The corolla is of a bluish purple; and the whole plant is pilose and canescent. It is, in all probability, only a variety of *L.* fruticòsum.

1102



E'*chium* L. There are some species of this genus natives of Teneriffe, the Canary Islands, and Madeira, on rocks. They have mostly splendid blue or white flowers, and some of them, such as *E.* gigantèum, grow as high as 10 ft. On dry rockwork, in a warm sheltered situation, we have no doubt they would all prove half-hardy. *E.* càndicans *L.*, *Bot. Reg.*, and t. 44., our *fig.* 1102., is one of the most common species in British green-houses. It is a native of Madeira, on high rocks; was introduced in 1777; grows to the height of from 2 ft. to 4 ft.; and produces its blue, campanulate flowers in May and June.

Heliotròpium peruviànum L., H. *p. hýbridum* Hort. Brit., and H. *corymbòsum* Ruiz et Pav., Bot. Mag., t. 1609., are Peruvian under-shrubs, well known for their fragrant flowers, and on that account introduced into every flower-garden. Plants are raised by cuttings early in spring; and, being turned out into a bed of rich light soil, they flower freely all the summer, till they are destroyed by frost. Two or three stock plants should be kept through the winter, in the green-house or pit, to be ready to be placed in a hot-bed or stove, in order to furnish abundance of cuttings in spring. (See the mode of treating *Ròsa* índica by Mr. Elles, noticed p. 801.)

CHAP. LXXXIII.

OF THE HALF-HARDY LIGNEOUS PLANTS OF THE ORDER CORDIA'CEÆ.



1103

Ehrètia serràta Roxb. Cor., 1. t. 55., and our *fig.* 1103., is a low tree, a native of the East Indies and China. Introduced in 1795, and generally kept in stoves; but a plant has stood, since 1830, against a wall in the Horticultural Society's Garden; where it grows rapidly, flowers freely, and appears quite hardy. A plant, as a standard, in the open garden, at Messrs. Loddiges's, has the shoots killed down every year to within 1 ft. of the ground; but the stool sends out fresh shoots every spring, which generally attain the height of 3 ft. or 4 ft. in the course of the summer, and make a fine appearance, from the large size of their leaves. The circumstance of a plant like this, a native of the East Indies, and so long considered as a stove plant in England, having lived in the open garden for several years; and, against a wall, having not only lived, but flowered freely; ought to be a great encouragement to cultivators to try almost every kind of plant, whatever be its native country, in the open air, when they have an opportunity. We do not recommend the trial of scarce and valuable stove plants; and from the palms, Orchidàceæ, and other endogenous orders or tribes, perhaps little is to be hoped for in the way of acclimatisation: but all herbaceous plants that die down annually to the ground, and all exogenous ligneous plants, deserve a trial, when a plant can be spared without injuring the collection to which it belongs. If, after a thousand trials, one species only should have proved sufficiently hardy to endure the open air in our climate, the recompense to the cultivator will be ample. Let him not forget, in making experiments of this kind, that *Aúcuba* japónica was originally treated as a stove plant, and K*érria* japónica as an inhabitant of the green-house.

CHAP. LXXXIV.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER SOLANA'CEÆ.

The few ligneous or suffruticose hardy plants contained in this order are included in the genera *S*olànum, *L*ýcium, and Crabówski*a*, which are thus characterised : —

*S*OLA'NUM *Pliny*. Calyx 5-cleft, rarely 4-cleft. Corolla rotate, rarely campanulate, usually 5-cleft. Anthers connivent, dehiscing by pores at the apex. Berry 2-celled, rarely 4-celled. (*Don's Mill.*, iv. p. 398.)

*L*Y'CIUM *L.* Calyx 5-toothed, or 3—5-lobed. Corolla funnel-shaped or tubular. Anthers usually exserted, and not connivent, opening lengthwise. Berry 2-celled. (*Don's Mill.*, iv. p. 398.)

CRABO'WSKI*A* Schlecht. Calyx 5-toothed. Corolla funnel-shaped. Limb convolute in æstivation, reflexed. Drupe containing two, 2-celled, bony carpels. Cells 1-seeded. (*Don's Mill.*, iv. p. 400.)

GENUS I.



*S*OLA'NUM *Pliny*. THE NIGHTSHADE. *Lin. Syst.* Pentándria Monogýnia.

Identification. Tourn. Inst., p. 149. t. 62. ; Lin. Gen., No. 251. ; Schreb. Gen., No. 337. ; Juss. Gen., 126., ed. Usteri, p. 141. ; Mœnch Meth., p. 473. ; R. Br. Prod., 444. ; Dunal Mon. Sol., 115. ; Lindl. Nat. Syst. Bot., p. 295. ; Don's Mill., 4. p. 400.

Synonymes. *Melongèna* Tourn. Inst., p. 151. t. 65. ; Pseùdo-Cápsicum *Mœnch Meth.*, p. 476. ; Nyctèrium *Vent. Jard. Malm.*, p. 85. ; Aquártia Jacq. Amer., p. 15. t. 12. ; Morelle, *Fr.* ; Nachtschatten, *Ger.*

Derivation. The first use of the word *Solanum* occurs in the writings of Tragus, who applied it to Chenopòdium hýbridum. It is said to be derived from *solari*, to console. The Greeks called our European solanums *struchnoi*, a name which Linnæus transferred to the genus of tropical shrubs, Strýchnos, to which the nux vomica belongs. (*Bot. Reg.*, t. 1516.)

Gen. Char., &c. *Caly* permanent, 5-, rarely 4-, cleft. *Corolla* rotate, rarely campanulate, 5-, rarely 4-, cleft. *Anthers* oblong, connivent, opening by 2 pores at the apex. *Berry* almost globose, 2—3—4-celled, but usually 2-celled. (*Don's Mill.*, iv. p. 400.) — Herbs or shrubs, unarmed or prickly, rarely spiny. Leaves undivided, sinuated, lobed, impari-pinnate, or decompound, usually alternate; but, in many species, twin, rarely ternary. Peduncles solitary or numerous, simple or multifid, axillary or extra-axillary, 1- or many-flowered, opposite the leaves, or scattered, or terminal. The pedicels in *S.* tuberòsum are articulated under the flower. The fruit of *S.* esculéntum is large and 5-celled. In some species, the flowers are sometimes 6—9-cleft.

⅃ 1. *S.* DULCAMA'RA *L.* The Bitter-sweet, *or woody* Nightshade.



1104

Identification. Lin. Sp., p. 264. ; Don's Mill., 4. p. 409. ; Smith's Eng. Fl., 1. p. 317. ; Lodd. Cat., ed. 1836.

Synonymes. *S.* scándens, *Neck. Gallo-Bel.*, 119. ; Dulcamàra flexuòsa *Mœnch Meth.* ; p. 514. ; *S.* scándens seu Dulcamàra *Tourn. Inst.*, p. 149. ; Amàra dúlcis *Gerard Emac.*, 350. ; Dúlcis amàra *Trag.*, 816. ; Glycýpicros seu Dulcamàra *Bauh. Hist.*, 2. p. 109. icon. ; la Morelle grimpante, *Régnault Bot. Icon.*

Engravings. Engl. Bot., t. 565. ; Baxt. Brit. Fl. Pl., vol. 2. t. 110. ; Curt. Fl. Lond., 1. t. 14. ; Fl. Dan., t. 607. ; Woodv. Med. Bot., 97. t. 33. ; Stev. et Church. Med. Bot. Icon. ; and our *fig.* 1104.

Spec. Char., &c. Shrubby, scandent, flexuous. Leaves ovate-cordate; superior ones hastate. Corymbs almost opposite the leaves. Shrub glabrous. Leaves cordate; superior ones hastate, all quite entire. Corymbs panicled. Corolla violet-coloured, with reflexed segments, each segment furnished with 2 green spots at the base. Berries elliptic, red. (*Don's Mill.*, iv.

p. 409.) A climbing shrub, a native of Europe, Asia, and North America, in hedges and among bushes; plentiful in Britain; flowers in June and July.

Varieties.

- S. *D.* 1 *violàcea* Hort. Eyst., p. 385. t. 384. No. 3. — Corollas violet.
- S. *D.* 2 *álba* Lin. Fl. Suec., p. 66. — Corollas white. There are plants of this variety in the collection of Messrs. Loddiges.
- S. *D.* 3 *cárnea* Cels. Ups., 32.— Corollas flesh-coloured.
- S. *D.* 4 *plèna* Tourn. Inst., 149., Hort. Eyst., l. c. — Corollas double.
- S. *D.* 5 *variegàta* Munt., fig. 156., Tourn. Inst., 149., Lodd. Cat., ed. 1836. — Leaves variegated.
- S. *D.* 6 *hirsùta* Don's Mill., iv. p. 409.; *S.* littoràle *Hort.* — Plant hairy or downy. Flowers violet. Found on the sea coast. There are plants in Messrs. Loddiges's collection.
- S. *D.* 7 *rupéstris* Schmidt Fl. Bot., p. 69. — Stem erect. Leaves ovate, quite entire. Racemes few-flowered, dichotomous. A native of Bohemia. (*Don's Mill.*, iv. p. 409.)

Description, Properties, &c. The stems of this species are roundish, branched, twisted, and climbing by elongation, among other shrubs, and in hedges, to the height of 6 ft. or 8 ft. or upwards. When bruised, broken, or rubbed, they yield a strong and peculiar odour, not unlike that which proceeds from rats and mice. The roots smell like potatoes; and both roots and stalks, upon being chewed, first cause a sensation of bitterness, which is soon followed by a considerable degree of sweetness, whence the specific name. The plant has been in repute for its medical virtues since the days of Theophrastus, by whom it was called *V*ìtis sylvéstris; by Pliny, it was called Melortum. Gerard, Boerhaave, Cullen, and others, attribute to the berries, and also to the leaves and stalks, many virtues; and the plant is still in great repute among rustic practitioners. In Wales a salve is made from the leaves, which is considered infallible in removing bruises. A decoction of the whole plant, or an infusion of the young twigs, is considered excellent in rheumatic cases, and also in jaundice and scurvy. The berries are poisonous; and, as they are common in hedges, they are very frequently eaten by children, on whom they operate by exciting violent vomiting and purging. To lessen their deleterious effects, warm water should be administered immediately, and in large quantities, to dilute the poison, and provoke vomiting. To prevent vomiting, when an infusion or decoction of the plant is taken medicinally, it is diluted with milk. (*Smith's Eng. Fl.*, i. p. 118.) Trained to a single stem, to the height of 6 ft. or 8 ft., and supported by a strong iron rod, with a parasol top, this common hedge weed might form a very handsome gardenesque pendulous tree. The Acherόntia A'tropos Fab., in its larva state (fig. 1081. in p. 1253.) feeds on the bitter-sweet and the elder, as well as on the common white jasmine.

2. *S.* SUFFRUTICO'SUM *Schousb.* The suffruticose Nightshade.

Identification. Schousb. ex Willd. Enum., p. 236.; Dun. Sol., p. 154.; Syn., p. 13.; Don's Mill., 4. p. 413.

Spec. Char., &c. Stem unarmed, suffruticose. Leaves ovate, dentately angular, nearly glabrous, ciliated. Flowers subpanicled (ex *Dun.*). Umbels extra-foliaceous, pedunculate (ex *Willd.*). Branches 2-edged, or quadrangularly winged from the decurrence of the petioles. Angles toothed. Leaves large, glaucous, covered above with soft hairs while young. Flowers white. Berries black. Very like S. nigrum; but the stem is shrubby, the leaves larger, and the flowers more numerous, &c. (*Don's Mill.*, 4. p. 413.) A shrub, a native of Barbary, where it grows to the height of 4 ft., and flowers from May till September. It was introduced in 1804; but we have not seen the plant.

3. *S.* CRI'SPUM *R. & S.* The curled-*leaved* Solanum.

Identification. Rœm. et Schult. Sp. Pl., 4. p. 595.; Fl. Peruv., 2. f. 1. t. 158. *f. a.*; Dunal Solan., 159.; Syn. p. 16. No. 78.; Lindl. Bot. Reg., t. 1516.; Don's Mill., 4. p. 414.
Engravings. Bot. Reg., t. 1516.; and our *fig.* 1105.

Spec. Char., &c. Stem shrubby. Leaves ovate, subcordate, wavedly curled, acuminate. Flowers corymbose. (*Rœm. et Schult. Sp. Pl.*, iv. p. 95.) Leaves all simple, undivided, ovate, or cordate, acuminate, petiolate, slightly curled at the margin; younger leaves powdery, but full-grown ones green. Cymes



1105

many-flowered, terminal, all the parts powdery. Bracteas none. Calyx short, 5-toothed. Corolla middle-sized, of a bluish lead-colour. Anthers equal, yellow. (*Lindl.*) A native of Chiloe, in waste places and hedges. Introduced by Mr. Anderson, collector to Mr. Lowe of the Clapton Nursery, in 1830. It is a hardy vigorous-growing plant, of a much more ligneous character than *S.* Dulcamàra, subevergreen, and covered with flowers nearly the whole summer. A plant in the Horticultural Society's Garden attained the height of 10 ft., against a wall, in 3 years; and its stem is between 3 in. and 4 in. in diameter: one in the Clapton Nursery is still larger. As this species will grow in any soil, and is readily propagated by cuttings, it promises to be of great value as an ornamental climber, for rapidly covering naked walls. Dr. Lindley observes that, "if tied to a stake, and thus forced to grow erect, it will throw out a great number of lateral branchlets, at the end of every one of which is a bunch of flowers. It this state it was exhibited by Mr. Lowe of Clapton, at a meeting of the Horticultural Society, in April, 1832, and was greatly admired." (*Bot. Reg.*, t. 1516.) It is readily propagated by cuttings, and promises to be a most valuable shrub for covering naked walls, or varying ruins or rockwork. The smooth shining green of its leaves, which are seldom eaten by insects, and the profusion of its flowers, which are bluish, render it highly ornamental.

■ 4. *S.* BONARIE'NSE *L.* The Buenos Ayres Nightshade.

Identification. Lin. Sp., No. 264., exclusive of the syn. of Plum.; Dun. Sol., 198., Syn., p. 34.; Dill. Elth., p. 264.; Don's Mill., 4. p. 429.
Engravings. Dill. Elth., p. 264. t. 272. f. 351.; and our *fig.* 1106.



1106

Spec. Char., &c. Shrubby, almost unarmed. Leaves ovate-oblong sinuately repanded, smoothish. Racemes corymbose, lateral, or extrafoliaceous. Stem green, prickly at the base; adult stems unarmed. Leaves sometimes entire, rarely prickly. Corymbs large. Calyx 4—5-cleft. Segments subulate. Corolla large, white, downy outside. Berry globose, ? yellow, 4-celled, size of a small pea. Root creeping. (*Don's Mill.*, iv. p. 429.) A shrub, a native of Buenos Ayres, where it grows from 6 ft. to 10 ft. in height, flowering from June to September. It was introduced in 1727; and a plant in the Chelsea Garden has stood against the wall for 50 years, and is now 8 ft. high.

App. i. *Half-hardy ligneous or fruticose Species of* Solànum.

Solànum Balbisii Dunal, Bot. Reg., t. 140., is a native of South America, with blue flowers, which are produced from April to September. It was introduced in 1816, and, at first, treated as a green house plant; but a specimen planted against the wall in the Horticultural Society's Garden, in 1833, grows vigorously, and flowers freely every year. It belongs to the section Dulcamàra, of which there are a number of species or varieties indigenous to almost every part of the world, which are, in all probability, half-hardy or hardy. There are several shrubby sorts, unnamed, from Valparaiso, which have stood out several years in the Chelsea Botanic Garden; and a number of names in the enumeration in our *Hortus Britannicus* seem to indicate that the plants might be tried in the open air in favourable situations.

S. betàceum Cav., Bot. Rep., t. 411., is a native of South America, from which country it was introduced into Britain in 1803. It forms a splendid shrub, 10 ft. or 12 ft. high, and produces egg-shaped fruit, of a deep crimson colour. The fruit are about the size and shape of magnum bonum plums, and hang down in clusters of three or four together. (*Gard. Mag.*, vol. ii. p. 105.) A plant of this species in the Cambridge Botanic Garden, in 1816, produced leaves nearly a foot in length, and half a foot in breadth; giving out, when handled, an odour resembling that of the bruised wood of *S.* Dulcamàra. This species resembles, in its free habit of growth, Brugmánsia suavèolens; and it is observed by a correspondent of the *Gardener's Magazine*, that it is likely to thrive and flower under the same treatment as that plant. The same writer adds, "did the plants of *S. betàceum*, when planted out, produce only a copious clothing of such leaves, they would, in themselves, be striking, and impart an additional tropical feature to the British flower-garden." (*Ibid.*, p. 155.) The plants of this species in the Bristol Nursery are said to be somewhat different from that figured in the *Botanical Repository*. (*Ibid.*, p. 269.)

1107



S. *angulàtum* R. et S., Dun. Sol., 2. 95. t. 1., is a native of Lima, introduced in 1825. It has large angulated prickly leaves, with purple veins and petioles. Preserved through the winter in a stove, and turned out in the spring, it makes a splendid appearance in the flower border.

S. *marginàtum* W., Bot. Mag., t. 1928., is a native of Africa, and forms an evergreen shrub, 4 ft. or 5 ft. high., striking from the mealy whiteness of its leaves.

S. *Pseùdo-Cápsicum* L., Cápsicum *Am*òmum Plinii Gerard, is a native of Madeira, an old inhabitant of our green-houses. It grows 4 ft. or 5 ft. high, and produces red, or yellowish fruit, about the size of cherries. Gerard says, "it is a rare and pleasant plant, kept in pots and tubs in green-houses during the extremity of winter, and set abroad in March and April."

S. *sodòmeum* L., the apple of Sodom, is a native of different parts of Africa, and also of Sicily, and the south of Italy. It is a shrub, with numerous short and thick branches, armed with many spines. The leaves are above 4 in. long, and 2 in. broad. The flowers are blue, and the berries yellow, as large as walnuts. It abounds, along with Spártium inféstum *Presl*, on the coast of Calabria, and at the foot of Mount Etna. (*Comp. Bot. Mag.*, i. p. 95.)

S. *ligústrinum* Lodd. Bot. Cab., t. 1963., and our *fig.* 1107., is a native of Chili, introduced by Mr. Cumming in 1831, and flowering in a sheltered border from May to September. It is a free-growing shrub, readily propagated by cuttings; and judging from the plant in the Chelsea Botanic Garden, from which our figure was taken, we should think it tolerably hardy,

GENUS II.

LY'CIUM *L.* THE BOX THORN. *Lin. Syst.* Pentándria Monogýnia.

Identification. Lin. Gen., 1262.; Lam. Ill., t. 112.; H. B. et Kunth Nov. Gen. Amer., 3. p. 50.; Lindl. Nat. Syst. Bot., 2d edit., p. 295.; Don's Mill., 4. p. 457.

Synonymes. Jasminöides *Niss. in Act. Gall.*, 1711, *Mich. Gen.*, 224. t. 105.; Matrimony Vine, *Amer.*; Lycien, *Fr.*; Bocksdorn, *Ger.* One species, *L.* bárbarum, is commonly called the Duke of Argyll's tea tree, from the circumstance of a tea plant (*Thèa* víridis) having been sent to the Duke of Argyll at the same time as this plant, and the labels having been accidentally changed.

Derivation. Derived from *Lycia*, in Asia Minor; hence the *lukion* of Dioscorides; a name given by him to a thorny shrub, which was supposed by Dr. Sibthorp to have been the *Rhámnus* infectòrius, but which Mr. Royle, with greater probability, regards as identical with a species of *Bérberis*, which he has denominated *Bérberis Lýcium*.

Description, &c. Thorny rambling shrubs, in general producing long slender shoots, and assuming the character of climbers. Natives of Europe, Asia, Africa, and America. Hedges may be formed of the first nine sorts.

1. *L.* EUROPÆ`UM *L.* The European Box Thorn.

Identification. Lin. Syst., 228.; Mant., p. 47.; Willd. Enum., 1. p. 246.; Sibth. et Smith Fl. Græc., t. 236.; Don's Mill., 4. p. 458.; Lodd. Cat., ed. 1836.

Synonymes. *L.* salicifòlium *Mill. Dict.*, No. 3., *Mich. Gen.*, p. 224. t. 105. f. 1., *Mill. Icon.*, t. 171. f. 2.; Jasminöides aculeàtum *Mich.*

Engravings. Mich. Gen., t. 105. f. 1.; Mill. Icon., t. 171. f. 2.; and our *fig.* 1108.

Spec. Char., &c. Branches erect, loose. Buds spinescent. Leaves fascicled, obovate-lanceolate, obtuse, or spathulate, bent obliquely. Flowers twin or solitary. Corolla funnel-shaped. Stamens exserted, but shorter than the limb. Calyx 5-cleft, ruptured at the side. Corollas pale violet, reticulated with red veins; tube greenish. (*Don's Mill.*, iv. p. 458.) A rambling



1108

shrub, with long slender shoots, and prone to throw up innumerable suckers; a native of the south of Europe, where it grows to the height of from 10 ft. to 12 ft.; flowering from May till August. It was introduced in 1730, and is common in British gardens; where it is valuable for covering naked walls, as it grows with extreme rapidity, and flowers and fruits freely, in almost any soil or situation. Established plants, in good soil, will make shoots 10 ft. or 12 ft. in length in one season; and the plant, when trained against a house or high wall, will reach the height of 30 ft. or 40 ft., as may be seen in some courts in Paris. Trained to a strong iron rod, to the height of 20 ft. or 30 ft., and then allowed to spread over an umbrella head, it would make a splendid bower. Its shoots would hang down to the ground, and form a complete screen on every side, ornamented from top to bottom with ripe fruit, which is large, and bright scarlet or yellow; with unripe fruit, which is of a lurid purple; or with blossoms, which are purple and white. Some idea of the quantity of ripe and unripe fruit, and of blossoms, which may be found on a shoot at one time, may be formed from *fig.* 1108., which is only a portion of a shoot, the upper part of which (not exhibited in the figure) contained two or three dozen of fruit, all ripe at once. If it were required to open the sides of a bower covered with this plant, the shoots could be tied together so as to form columns, at regular distances all round: but they must be untied in an hour or two afterwards, to prevent the shoots in the interior of the column from being heated so as to cause them to drop their leaves and fruit. Price of plants, in the London nurseries, from 6*d.* to 1*s.* each; at Bollwyller, 30 cents; and at New York, 37½ cents.

Varieties. There is a variety with yellow fruit, and another with the fruit roundish; and, in our opinion, *L.* bárbarum, chinénse, ruthénicum, Sháwi, and Tre*wiánum*, all which we have seen in Loddiges's arboretum; and, probably, other sorts which we have not seen, are nothing more than variations of the same form.



1109

⊥ 2. *L.* (E.) BA'RBARUM *L.* The Barbary Box Thorn.

Identification. Lin. Sp., 277.; Willd. Sp., 4. p. 1059., exclusive of the synonymes of Shaw and Lam.; Don's Mill., 4. p. 458.; Lodd. Cat., ed. 1836.

Synonymes. *L.* halimifòlium *Mill. Dict.*, No. 6.; *L.* bárbarum a vulgàre *Ait. Hort. Kew.*, 1. p. 257. *Schkuhr Handb.*, 1. p. 147. t. 46., *Hayne Term. Bot.*, t. 10. f. 5., *Du Ham. Arb.*, 1. p. 306. t. 121. f. 4., *Mich. Gen.*, t. 105. f. 1.; the Duke of Argyll's Tea Tree.

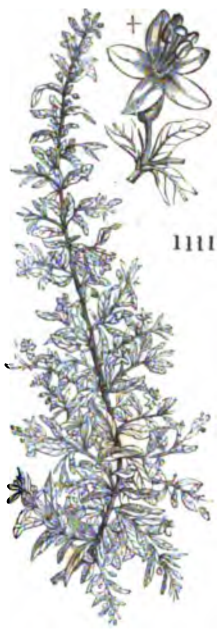
Engravings. Wats. Dend. Brit., t. 9.; and our *fig.* 1109.

Spec. Char., &c. Branches dependent. Buds spiny. Leaves lanceolate, flat, glabrous, acute. Flowers twin, extra-axillary, pedicellate. Corolla funnel-shaped. Stamens exserted, about equal in length to the limb. Branches angular.

Buds often without spines. Calyx 2—3-lobed. Corolla with a purple limb, and yellowish base. Stigma 2-lobed. Berry ovate, yellow. Stamens bearded near the base. There is a variety of this, having livid or pale corollas, and reddish yellow berries. (*Don's Mill.*, iv. p. 458.) A climbing shrub, a native of the north of Asia, Africa, and south of Europe; where it flowers from May till August. It was introduced in 1696; and what has been said respecting *L.* europæ'um is equally applicable to this sort, which, we think, may, without any hesitation, be pronounced only a variety of it.

* ⊥ 3. *L.* (E.) CHINE'NSE *Mill.* The Chinese Box Thorn.

Identification. Mill. Dict., No. 5.; Bunge in Mem. Acad. Petersb., 2. p. 123.; Don's Mill., 4. p. 458.
Synonymes. *L.* bárbarum β chinénse *Ait. Hort. Kew.*, 1. p. 257.; *L.* bárbarum *Lour. Coch.*, 1. p. 165. ?; *L.* ovàtum *N. Du Ham.*, 1. p. 107.
Engravings. Lam. Ill., t. 112. f. 2.; Wats. Dend. Brit., t. 8.; and our *fig.* 1110. from the N. Du Ham., and *fig.* 1111. from, we think, a specimen in the Horticultural Society's Garden.



1111

Spec. Char., &c. Branches pendulous, prostrate, striated. Buds spinescent. Leaves by threes, ovate, acute, attenuated at the base. Peduncles much longer than the calyx, which is entire. Stamens exserted. Said by Bunge to be nearly allied to *L.* ruthénicum; but differs in the leaves being broad-ovate. Corollas purple. Berries orange-coloured. Shoots very long (ex *Mill.*). We know not whether the plants described by Miller and by Bunge are the same: the plant here meant is that of Bunge. (*Don's Mill.*, iv. p. 458.) A climbing shrub, a native of China, about Pekin and Canton; and of Cochin-China; where it flowers from May till August. It is uncertain when it was introduced; but there are plants in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges; and the chief difference between it and *L.* europæ'um is, that it is a smaller, weaker plant.



1110

⊥ 4. *L.* (E.) TREWIA'NUM G. Don. Trew's Box Thorn.

Identification. Don's Mill., 4. p. 458.; Lodd. Cat., ed. 1836.
Synonyme. *L.* bárbarum *Lam. Dict.*, 3. p. 509., ex *Poir. Suppl.*, 3. p. 427., *Trew Ehret.*, t. 68., exclusive of the synonymes; *L.* chinénse *N. Du Ham.*, 1. p. 116., *Pers. Ench.*, 1. p. 231. No. 9.
Engraving. N. Du Ham., t. 30.

Spec. Char., &c. Branches diffuse, angular. Buds spinose. Leaves petiolate, lanceolate, acute. Peduncles 1-flowered, solitary, or twin, extra-axillary. Calyx 2—3-cleft. Corolla funnel-shaped. Stamens exserted. This species differs from *L.* chinénse *Mill.* in the spines, and from *L.* bárbarum in the leaves. Branches rufescent. Spines few. Corolla fine purple, with a white star in the centre. Filaments pilose at the base. Berry ovate. (*Don's Mill.*, iv. p. 458.) A shrub, a native of China, where it grows 6 ft. high, flowering from May till August. It was introduced in 1818; and, judging from the plants in the Hackney arboretum, is scarcely, if at all, different from *L.* europæ'um.

⊥ 5. *L.* (E.) RUTHE'NICUM *Murr.* The Russian Box Thorn.

Identification. Murr. Comm. Goett., 1779, p. 2. t. 2.; Bieb. Fl. Taur. Cauc., 1. p. 166.; Don's Mill., 4. p. 458.; Lodd. Cat., ed. 1836.

Synonymes. L. tatáricum *Pall. Fl. Ross.*, 1. p. 78. t. 49.; Lycien de la Russie, *Fr.*
Engravings. Murr. Comm. Goett., 1779, p. 2. t. 2.; and our *fig.* 1112.

Spec. Char., &c. Branches dependent. Buds spinescent. Leaves linear-lanceolate, fleshy, obtuse, attenuated at the base, solitary, or sub-fasciculate. Peduncles longer than the calyx. Calyx with 5 unequal teeth. Stamens exserted, equal to the limb. Calyx usually irregularly 5-toothed, rarely 2—3-lobed, as in *L.* bárbarum. Corolla with a white tube and purplish limb. Leaves grey, like those of *L.* àfrum. (*Don's Mill.*, iv. p. 458.) A climbing shrub, a native of Siberia, in nitrous places; on the Wolga, and in Hyrcania; flowering from June till August. It was introduced in 1804; and, judging from the plants in Messrs. Loddiges's collection, is scarcely, if at all, different from *L.* europæ'um.

1112



Variety.

♣ L. *r.* 2 *cáspicum* Pall. Fl. Ross., t. 49. f. A.— Leaves shorter. Buds more spinose. Flowers smaller. Native about the Caspian Sea. (*Don's Mill.*, iv. p. 458.)

♣ 6. *L.* (E.) LANCEOLA'TUM *Poir.* The lanceolate-*leaved* Box Thorn.

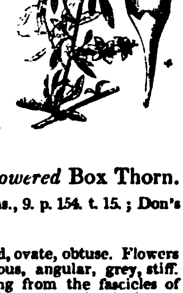
Identification. Poir. Suppl., 3. p. 429.; Don's Mill., 4. p. 458.
Synonyme. L. europæ'um β *Dec. Fl. Fr.*, No. 2699., *Pers. Ench.*, 1. p. 231. No. 8., *N. Du Ham.*, 1. p. 123. t. 32., *Loud. Hort. Brit.*, ed. 1829.
Engraving. N. Du Ham., t. 32.

Spec. Char., &c. Branches dependent, reflexed. Buds spinescent. Leaves lanceolate, nearly sessile, acute at both ends. Flowers solitary, extra-axillary, pedicellate. Corolla funnel-shaped. Stamens exserted. Calyx unequally 5-toothed. Corolla purple, with a white bottom. Berry oblong, red. (*Don's Mill.*, iv. p. 458.) A climbing shrub, a native of the south of Europe, particularly of Naples, Greece, &c.; where it flowers from May till August. When it was introduced is uncertain, and we have never seen the plant.

♣ 7. *L.* (? E.) TURBINA'TUM *Du Ham.* The turbinate-*fruited* Box Thorn.

Identification. N. Du Ham., 1. p. 119. t. 31.; Pers. Ench., 1. p. 231., exclusive of the synonyme of Lam., No. 3.; Don's Mill., 4. p. 458.
Synonymes. L. halimifòlium *Mill. Dict.*, No. 6.?; *L.* bárbarum β *Dec. Fl. Fr.*, No. 2700.
Engravings. N. Du Ham., t. 31.; and our *fig.* 1113.

1113



Spec. Char., &c. Stems erect, fascicled. Branchlets dependent, terete. Buds spiny. Leaves sessile, lanceolate, acuminated. Flowers aggregate, pedicellate, extra-axillary. Corolla funnel-shaped. Stamens exserted. Calyx trifid. Berry red, and turbinate. Corolla violaceous, with a white bottom. (*Don's Mill.*, iv. p. 458.) It is a climbing shrub, a native of China, where it flowers from May till August. It was introduced in 1709; but we have not seen the plant. Though we consider many of the sorts of this genus, which are described as species, as only different varieties, it does not follow from that circumstance that each sort may not be tolerably distinct. Wherever plants are raised in great numbers from seed, it is easy to pick out from among the seedlings many different varieties, which, if propagated by extension, will remain distinct till the end of time. We must confess, however, that we know of very few genera of ligneous plants, indeed, where so many of the different alleged species so very closely resemble each other, as in *Lýcium*. We have no doubt that by taking a dozen plants of any one of the kinds, from numbers 1 to 9 inclusive, and placing them in a dozen different climates, soils, and situations, we should have a dozen sorts, as well entitled to be considered as species, as most of those which are here described as such.

♣ 8. *L.* (? E.) TETRA'NDRUM *Thunb.* The tetrandrous-*flowered* Box Thorn.

Identification. Thunb. Prod., p. 37.; Lin. Suppl., 150.; Thunb. in Lin. Trans., 9. p. 154. t. 15.; Don's Mill., 4. p. 460.
Engraving. Lin. Trans., 9. t. 15.

Spec. Char., &c. Spiny, erect. Branches angular, straight. Leaves fascicled, ovate, obtuse. Flowers nearly sessile. Corollas quadrifid, tetrandrous. Stem twisted, glabrous, angular, grey, stiff. Branches horizontal, spiny. Leaves a line long. Flowers solitary, rising from the fascicles of leaves on short pedicels. Very like *L.* àfrum, but is distinguished from that species in the leaves being more fleshy, and in the flowers being tetramerous and tetrandrous. It is also, perhaps, the *L.* capénse of *Mill. Dict.*, No. 7., of which the following description is given: —" Leaves oblong-ovate, thickish, crowded. Spines strong, leafy. Leaves scattered, solitary, or fascicled, thick, pale green, permanent." (*Don's Mill.*, iv. p. 460.) A shrub, a native of the Cape of Good Hope, about Cape Town; where it grows to the height of 6 ft. or 7 ft., flowering in June and July. It was introduced in 1810; but we have not seen the plant.

9. *L.* (? E.) SHA'WI Rœm. Shaw's Box Thorn.

Identification. Rœm. et Schultes Syst., 4. p. 693.; Don's Mill., 4. p. 458.
Synonyme. L. europæ'um *Mill. Dict.*, No. 4., *Shaw Afr.*, p. 349. f. 349.

Spec. Char., *&c.* Branches dependent, rather tomentose at the apex. Buds spinescent. Leaves ovate-lanceolate, thickish. Branches scattered. Prickles strong. Leaves short, thick, scattered. Flowers lateral, small, white. (*Don's Mill.*, iv. p. 458.) A shrub, a native of Barbary, where it grows 7 ft. or 8 ft. high; flowering in June and July. It was introduced in 1700.

10. *L.* A'FRUM *L.* The African Box Thorn.

Identification. Lin. Sp., 277.; Don's Mill., 4. p. 459.
Engravings. Mill. Icon., t. 171. f. 1.; Swt. Fl. Gard., 2d ser. t. 394.; Bot. Reg., t. 354.; Lam. Ill., 112. f. 1.; N. Du Ham., 1. p. 107—110.; Trew Ehret, 4. t. 24. f. 2.; Plenck Icon., t. 127.; Mich. Gen., p. 224. t. 105. f. 2.; Nis. Act. Par., 1711., p. 420. t. 12.; and our *figs.* 1114. and 1115.

Spec. Char., *&c.* Erect, spiny. Leaves fascicled, linear, canescent, attenuated at the base, obtuse, fleshy. Flowers almost axillary, solitary, drooping. Corola tubular, 3 times longer than the calyx. Stamens enclosed. Bark grey-coloured; the smaller branches frequently spiny. Leaves glaucous. Filaments bearded near the base, as in all the true species. Stigma slightly 2-lobed. Corolla violaceous rich purple above. Berry globose, violaceous. Calyx 5-toothed. (*Don's Mill.*, iv. p. 459.) It is a shrub, a native of some parts of Spain, the north of Africa, Palestine, Syria, Egypt, and Arabia Felix; where it grows to the height of from 6 ft. to 10 ft., flowering in May and June. It was introduced in 1712, and is very commonly kept in the green-house; but a plant in the Chelsea Botanic Garden has stood out against a wall since 1825, where it has attained the height of 12 ft., and flowers profusely every year. It is readily distinguished from all the other sorts by its dark blue or black fruit. Belon, in speaking of the plain of Jericho, and of the banks of the river Jordan, says, the bushes which bear the *lycion* grow in this plain; and we find in the *Bible* (Genesis, chap. l. v. 10, 11.), that the Children of Israel, in their journey from the land of Goshen to Canaan, came to the threshing-floor of Atadad; that is, in Hebrew, *lycium*; the plant being cultivated there for its berries, which were used in medicine as a purgative, known to the ancients by the name of *lucion*, and the mode of preparing which is indicated by Dioscorides. It is, however, doubtful, whether the berries of *Rhámnus saxátilis*, which are known to be cathartic, are not confounded with those of the *Lýcium* in this passage. *Lýcium áfrum* is one of the most ornamental species of the genus; and, though rather tender, it well deserves a place in every collection, against a wall. Plants, in the London nurseries, 2*s.* 6*d.* each.



1114



1115

L. *ovàtum* Hort. There are plants bearing this name in the Horticultural Society's Garden, and at Messrs. Loddiges's.

L. *spathulàtum* Hort. There is a plant bearing this name in the Horticultural Society's Garden against the wall.

GENUS III.

GRABO'WSKIA Schlecht. THE GRABOWSKIA. *Lin. Syst.* Pentándria Monogýnia.

Identification. Schlecht. in Linnæa, 7. p. 72.; Lindl. in Bot. Reg.
Synonymes. Lýcium sp. *Lin.*; Ehrètia sp. *L'Hérit.*; Crabówskia Don's Mill., 4. p. 480.
Derivation. In honour of *Dr. H. Grabowski*, one of the editors of *Flora Silesiaca.*

Description, *&c.* A shrub, with the habit of the genuine species of *Lýcium*, much branched, furnished with axillary spines. Leaves scattered, quite entire. Flowers from fascicles of leaves, or the revolute branchlets; or subcorymbose from the tops of the branchlets: hence, they appear as if they were panicled at the tops of the branches. (*Don's Mill.*, iv. p. 480.)

⅃ 1. G. BOERHAAV*IÆFO'LIA* Schlecht. The Boerhaavia-leaved Grabowskia.

Identification. Schlecht. in Linnæa, 7. p. 72.; Lindl. in Bot. Reg.
Synonymes. *Lýcium* boerhaav*iæfòlium* Lin. Suppl., p. 150., N. Du Ham., 1. p. 128., Lam. Dict., 3. p. 510.; Ehrè*tia halimifòlia* *L'Hérit. Stirp.*, 1. p. 45. t. 83.; *Lýcium* heterophýllum *Murr. Comm. Gött.*, 1783, p. 6. t. 21.; Jasminöìdes spinòsum *Du Ham. Arb.*, 1. p. 306. No. 5.; Crabówskia boerhaav*iæfòlium* Don's Mill., 4. p. 480.; Lycium paniculé, *Fr.*
Engravings. L'Hérit. Stirp., 1. t. 83.; Bot. Reg., t. 1985.; and our *fig.* 1116.

Spec. Char., &c. Leaves coriaceous, glaucescent, with a saltish, bitterish taste. Corolla white, having the throat veined with green. Stamens white. Stigma green. Nuts the form of those of *Coffèa arábica*, convex on one side, marked by a slender furrow in the middle, obtuse at top, and perforated by two roundish holes at the base: hence it is tridentate, the first tooth from the middle of the back, the other two from the sides: sometimes, but only by abortion, 1-celled. Albumen copious, fleshy. (*Don's Mill.*, iv. p. 480.) A shrub, a native of the south of Brazil, in woods, where it has been collected by Sello; but which was introduced from Peru by Joseph Jussieu into France, whence it was sent to this country in 1780. It grows to the height of 6 ft., and flowers in April and May. There are fine specimens of it in the Horticultural Society's Garden, against a wall; and in the Epsom Nursery, as a bush in the open garden; from which it appears to be as hardy as *Lýcium* europæ'um. The whole plant has a mealy white appearance; by which, and by the singular form of its leaves, it may be known at first sight from any species of *Lýcium*. Though it has been introduced into British gardens so many years since, and was known in France in the time of Du Hamel, it is rarely met with in collections; and, though so easily propagated by suckers, it is not to be found for sale in the nurseries.

1116

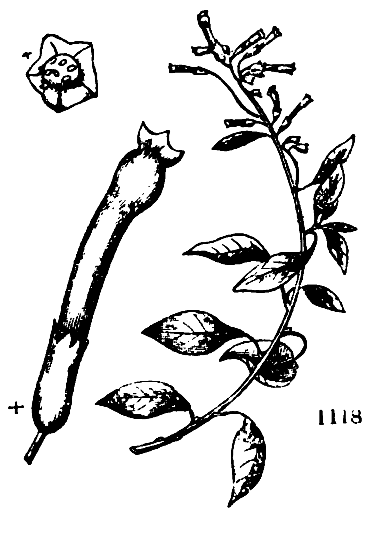


App. I. *Half-hardy ligneous Plants belonging to the Order Solanàceæ.*

Nicotiàna glaúca Grah., Bot. Mag., t. 287.; and our *fig.* 1118.; is a splendid suffruticose plant, which will grow to 10 ft. or 12 ft., or probably to 20 ft. or upwards, against a wall, making a fine appearance in the summer season, with its large glaucous leaves, and yellowish green flowers. A plant in the Horticultural Society's Garden has stood out since 1832; and, though its stems are occasionally cut down by the frost, yet the stool always pushes out vigorously in the spring. A plant of this species in the Chelsea Botanic Garden attained the height of 14 ft., in 1835, in the open border.



1117



1118

Brugmánsia sanguínea Ruiz et Pav.; B. bicolor *Pers.*, *Swt. Fl. Gard.*, 2d ser., t. 272.; and our *fig.* 1117.; has an arboreous stem, which rises to the height of from 10 ft. to 20 ft. The flowers are produced from the forks of the branches. Corolla funnel-shaped, 7 in. long, green towards the base, orange yellow farther along its length. The limb 5-lobed, of a deep orange scarlet; this colour, lessened in intensity, seems to extend down the tube, until it blends with the orange



1119



1120

yellow, which, in its turn, blends with the green below it. This species was raised in 1833, from imported seeds, at Hayes' Place, Kent, the seat of Miss Trail. "One of the plants survived the winter in the open border; and this has happened to be the first to flower, which it did in October, 1834. The rest of the plants began to blossom soon after, and all apparently varying in the degree of intensity of colour. In a sheltered border, with a southern aspect, we have no doubt of its flowering quite as well as if retained in the conservatory." (*Brit. Fl. Gard.*) This very beautiful plant well deserves trial against a wall, more especially in the south of England, where it is almost certain to succeed.

B. suavèolens Willd. Enum., *Datùra arbòrea Hort.*, is a well known ornament of the green-house; and, being deciduous, may be taken up in the autumn, when the wood is ripe, and the leaves have dropped, preserved in a cellar or pit through the winter, and turned out again in spring. *Fig.* 1120. will give an idea of the beauty of this plant; respecting which a great variety of information will be found in the *Gardener's Magazine*, particularly in vol. xii., at p. 589. An instance is there given of a plant being turned out into the open border on the 1st of June, with its ball entire; and, after it had grown a month, and the roots had been cut all round, close to the old ball, it was surrounded with a quantity of rotten manure, in consequence of which it grew so vigorously, that, from the middle of May to the end of September, it expanded 1050 flowers, each of which measured 50 square inches. In Germany it may frequently be seen splendidly in flower in the open border, the plants being taken up and preserved in dry cellars during winter.



1121



1122

Solándra grandiflòra L. is a rambling Jamaica shrub, with large pale yellow flowers, which, being deciduous, might be tried with the same kind of treatment as that recommended for Brugmánsia suavèolens. (See *Gard. Mag.*, vol. ii. p. 48., and vol. ix. p. 107.)

Céstrum noctúrnum L., Dill. Elth., p. 153. t. 185., and our *fig.* 1119., is a shrub, a native of the East Indies, where it grows to the height of 6 ft. or 7 ft., and produces its white flowers in October and November. Though generally kept in the stove, it has been found to stand the winter in the Horticultural Society's Garden, with no other protection than that of a wall.

C. Párqui *L., Bot. Mag.*, t. 1770., and our *fig.* 1122., is a native of Chili, with pale yellow flowers, which are produced in June and July. It stands out in the Chelsea Botanic Garden, and flowers freely every year. The circumstance of two species of a genus composed almost entirely of plants from hot climates succeeding so well in the open air, is an encouragement to try all stove plants whatever in that way; since many of them, hitherto kept in stoves, are, doubtless, as hardy as Céstrum.

Vèstia lycioìdes Willd.; *Cántua ligustrifòlia Juss., Bot. Reg.*, t. 299.; and our *fig.* 1121.; is a Chili

shrub, introduced in 1815, growing to the height of 3 ft., and producing its yellow flowers in abundance in June and July. It is almost hardy, having stood in the Kew Garden, against a wall, 6 years, without any protection whatever; and in various other gardens about London, where the soil is dry, as a border shrub.

CHAP. LXXXV.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER SCROPHULARIA'CEÆ.

This order, which is nearly allied to *Solanàceæ*, consists chiefly of herbaceous plants, the only hardy ligneous genus being Búddle*a*.

Genus I.



BU'DDLE*A* L. The Buddlea. *Lin. Syst.* Tetrándria Monogýnia.

Identification. Lin. Gen., No. 140.; Reich., 146.; Schreb., 184.; Houst. Phil. Trans. et Reliq Houst., t. 3.; Gærtn., t. 49.; Jus., 118.; Lindl. Nat. Syst. Bot., p. 292.; Don's Mill., 4. p. 596.
Derivation. Named by Dr. Houston, in honour of *Adam Buddle*, a botanical amateur, who is often mentioned in Ray's *Synopsis*, and whose dried collection of British plants is preserved in the British Museum.

Gen. Char., &c. *Calyx* 4-cleft, equal. *Corolla* tubular; limb 4-cleft, regular. *Stamens* 4, equal, enclosed. *Stigma* capitate or clavate. *Capsule* 2-celled, 2-valved; valves bifid. *Placenta* central, at length free. — Shrubs, with opposite branches, the young shoots quadrangular. Natives of South America, Asia, and Africa; but of which only one species, a native of China, is decidedly hardy in the neighbourhood of London.

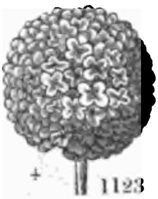
■ 1. B. globo'sa *L.* The globe-*flowered* Buddlea.

Identification. Ait. Hort. Kew., 1. p. 150.; Hope in Act. Harlem., vol. 20. pt. 2. p. 417. t. 11.; Curt. Bot. Mag., t. 174.; Don's Mill, 4. p. 597.
Synonymes. Búddlea globiflòra *N. Du Ham.*, 1. p. 85. t. 25.; B. capitàta *Jacq. Col.*, 2. p. 332., *Icon. Rar.*, t. 307.; *Pàlquin* Feuillée It., 3. p. 51. t. 38.; Buddleia globuleux, *Fr.*; Kopftragende Budleje, *Ger.*
Engravings. Act. Harlem., vol. 20. pt. 2. p. 417. t. 11.; Curt. Bot. Mag., t. 174.; N. Du Ham., 1. p. 85.; Feuillée It., 3. t. 38.; and our *figs.* 1123. and 1124.



1124

Spec. Char., &c. Branches tetragonal, clothed with hoary tomentum, as well as the under sides of the leaves. Leaves lanceolate, acuminated, crenated, petiolate. Heads of flowers globose, pedunculate. A shrub, a native of Chili, growing to the height of 12 ft. or 15 ft. in the climate of London, and producing its bright yellow globe-like heads of flowers, which are fragrant, from May to July. It was introduced in 1774, and is frequent in collections. North of London, it



1123

requires a dry sheltered situation, or to be planted against a wall. It will grow in any common soil, and is readily propagated by cuttings put in in autumn, and protected from the frost by a hand-glass. Price of plants, in the London nurseries, 1*s.* 6*d.* each. A plant at Purser's Cross is 12 ft. high and 15 ft. in diameter; and it has frequently ripened seeds, from which young plants have been raised.

App. i. *Half-hardy Species of Búddlea.*

Búddlea salvifòlia Lam.; Lantàna salvifòlia *Lin.*, *Jac. Sc.*, 1. t. 28.; is a native of the Cape of Good Hope, bearing some resemblance to the common species, but smaller in all its parts. It has been known to stand out for two or three years together against a wall, without any protection.

B. paniculàta Wall. is a native of Nepal, introduced in 1823, but not common in collections.

B. salìgna Willd., Jacq. Sc., 1. t. 29., is a native of the Cape of Good Hope, with white flowers, which are produced in August and September.

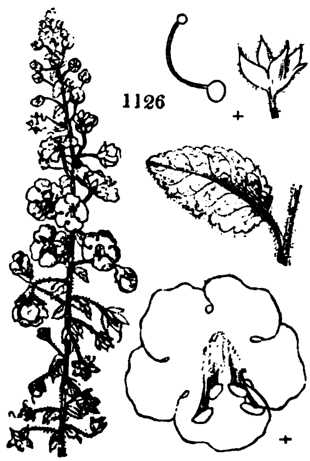
B. críspa Royle Illust., p. 291., is said to be a highly ornamental shrub, found at moderate elevations in the Himalayas.

App. I. *Half-hardy ligneous Plants of the Order Scrophulariàceæ.*

Hallèria lùcida L., Bot. Mag., t. 1744., and our *fig.* 1125., is a shrub, a native of the Cape of Good Hope, with shining leaves, and scarlet flowers, which are produced from June to August. A plant has stood out in front of the stove at Kew since 1826.



1125



1126

Maurándya semperflòrens Jacq., Bot. Mag., t. 460.; and *M. Barclayàna Bot. Reg.*, t. 1108.; are Mexican climbers, well known for the beauty of their flowers; and which, in warm situations, grow and flower freely against a wall in the open air, and may be protected during winter; or seeds, which they produce in abundance, may be sown early in the season in a hot-bed, and the plants brought forward in pots, and in due time turned out.



1127

Mímulus glutinòsus Willd., Bot. Mag., t. 354., is an evergreen shrub, a native of California, with rich orange-coloured flowers, which would, in all probability, thrive against a conservative wall with very little protection.

Anthocércis viscòsa R. Br., Bot. Reg., t. 1624., is a native of New Holland, introduced in 1822. It is a handsome evergreen shrub, with dark green leaves, and rather numerous, large, white flowers, which are produced in May and June. It is easily propagated by cuttings, on which account it well deserves a place in a warm sheltered border during the summer season, or against a conservative wall.



1128

Calceolària integrifòlia L., Bot. Reg., t. 744.; *C. rugòsa* Fl. Per., Hook. Ex. Fl., 29.; and *C. séssilis* Hort., see our *figs.* 1127, 1128.; and many other suffruticose hybrids; stand through the winter, as border shrubs, in many of the warmer parts of Devonshire and Cornwall; and with due care, in the neighbourhood of London, they may be kept alive on a conservative wall.

Verónica *decussàta* Ait., Bot. Mag., t. 242., and our *figs.* 1129, 1130., is an evergreen shrub, a native of the Falkland Islands, which grows to the height of 1 ft. or 2 ft., and produces its white or bluish white flowers from June to August. It is very easily protected, either at the foot of a wall or on rockwork, and stands out without any protection in the Isle of Portland, where it grows to the heigh' of 4 ft. or 5 ft.



1129



1130

Célsia lanàta Jac., Bot. Reg., t. 438., and our *fig.* 1126., is a suffruticose plant of uncertain origin, but with showy yellow flowers, which it produces from July to September. It is commonly kept in a frame, but would thrive well on conservative rockwork, in a favourable situation.

Caprària lanceolàta L.; Frœlínia salicifòlia *Bot. Mag.*, t. 1556.; is a native of the Cape of Good Hope, introduced in 1774. A plant has stood against the wall in the Chelsea Botanic Garden for several years; and, though it is generally klled down to the ground in winter, it has always hitherto sprung up again in spring, and made a much finer appearance than it could possibly have done in a pot.

The genera *Alonsòa R. et P.*, Angelònia *H. B. et Kunth*, *Lophospérmum* Don, *Rhodochìton* Zucc., *Nyctertnia* D. Don, all contain species which might be tried against a conservative wall in the south of England.

If, after perusing what is stated in this work respecting the half-hardy ligneous plants of any order or tribe, the reader will turn to the same natural order or tribe in our *Hort. Brit.*, he will generally find a number of other species, green-house or stove plants, and suffruticose or completely ligneous, from which he may increase his selection for trial in the open air.

CHAP. LXXXVI.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER LABIA'CEÆ.

Almost the whole of the plants of this order, which are technically ligneous or suffruticose, may be more properly treated, in gardens, as herbaceous plants than as shrubs; nevertheless, as this work would be incomplete without noticing them, we shall name some of the principal species, and refer for the remainder to our *Hortus Britannicus*. The best situation for a collection of ligneous Labiàceæ, is on dry rockwork.



1131

Saturèja *montàna* L., Fl. Græc. t. 543., and our *fig.* 1131., is a well-known culinary herb, a native of the south of Europe, which, on dry calcareous soil, will form a neat little evergreen bush, from 1 ft. to 2 ft. in height. S. *capitàta* Willd., a native of the Levant, is equally hardy, and, indeed, appears to be only a variety of the former. There are, also, some species or varieties from Sicily, Candia, and the Ionian Islands, which are considered as frame plants, and may be tried on conservative rockwork.



1132



1133

T*hỳmus vulgàris* L., and our *fig.* 1132., forms a neat little evergreen shrub, when kept in dry calcareous soil, or on rockwork: and T. *grandiflòrus* Hort.; T. Mastichìna *L.*, *Black.*, t. 134.; is a native of Spain, with hoary, hairy calyxes. In an arboretum where every single species or variety is to be exhibited by itself, such a beautiful and fragrant genus as *Thỳmus* may have a small cone or hemisphere of rockwork devoted to each species or variety. There are some half-hardy species, which might also be tried. They are not only beautiful when in flower, but are highly fragrant, and attractive to bees.

H*yssòpus officinàlis* L., and our *fig.* 1133., forms an undershrub of 2 ft. in



1134



1135

height, and is very ornamental when in flower. It should be treated like *Thymus*.

Teùcrium *angustifòlium* Schreb. is an evergreen undershrub, a native of Spain, which will grow to the height of 8 ft. or upwards, and is ornamental when covered with its blue flowers. T. *frùticans* (*figs*. 1135, 1136.) is a well-known half-hardy species, which will sometimes stand the open air in the neighbourhood of London, for several years in succession, on dry rockwork. T. *Màrum* L. (*fig*. 1134.), T. *flàvum*, T. *Pòlium*, and various others enumerated in the *Hortus Britannicus*, being all natives of the south of Europe, or the north of Africa, are half-hardy; or, in the south of England, in warm situations, in dry soil, quite hardy. T. *corymbòsum* R. Br. is a native of Van Diemen's Land, which has small leaves and white flowers. It has been raised in the Cambridge Botanic Garden, where it has attained the height of 3 ft.



1136

Phlòmis *fruticòsa* L., N. Du Ham, 6. t. 40., Bot. Mag., t. 1843., and our *fig*. 1137.; Jerusalem sage; is a native of Spain, with yellow flowers, appearing in June and July. This is a greyish evergreen shrub, growing 4 ft. or 5 ft. high, and, in dry soils, enduring 10 or 12 years. The flowers are produced in large whorls, and have a very conspicuous appearance. The plant well merits a place in collections, on account of the remarkable appearance of its foliage, independently altogether of its flowers. Other ligneous, evergreen, hardy species, with yellow flowers, will be found mentioned in our *Hortus Britannicus*.



1137

1138



P. *purpùrea* Smith Spic., 6. t. 3., and our *fig*. 1138., differs from the preceding sort, in having its flowers of a pale purple colour. Both sorts have a peculiar soapy smell.

Rosmarìnus *officinàlis* L., Fl. Græc., 1. t. 14., and our *fig*. 1139., is a well-known evergreen shrub, a native of the south of Europe, which has been an inhabitant of our gardens since 1548. There are plants of it in different gardens in the neighbourhood of London, which, as bushes in the open border, in 5 or 6 years have attained the height of as many feet, and breadth in proportion; thus forming very handsome evergreen bushes. We may refer in proof of this to the Twickenham Botanic Garden, and to the gardens of many small suburban villas. In a wild state, the rosemary grows 4 ft. or 5 ft. high; but there is a variety with broad leaves, which, when trained against a wall, will grow to the height of 10 ft. or 12 ft. As the plant flowers from January to April, it forms, when so treated, a very desirable garden ornament. There

are, also, a variety with the leaves variegated with gold colour, and a silvery-leaved variety; but these are often rather weaker, and more dwarf, than the species.



1139

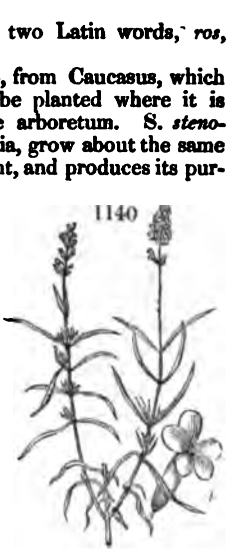
The wild rosemary is a native of the south of France, Spain, Italy, the Levant, Barbary, &c., on rocks and rocky hills; and, in some places, it is so abundant, that in spring, when it is in flower, the air is perfumed with its odour to a considerable distance. On this account, and also from the powerful attraction which it forms to bees, at a season when there are few other plants in flower, it has long been partially cultivated by the inhabitants of those countries of which it is a native. In Narbonne and Mahon, the rosemary is so abundant, partly from being indigenous, but principally from its being frequently used there to form hedges to gardens, that it communicates its flavour to the honey, which is considered the finest in France. The rosemary is mentioned, in many of the old Continental songs of the troubadours, as emblematic of that constancy and devotion to the fair sex, which was one of the characteristics of the days of chivalry. Garlands and chaplets were formed of myrtle, laurel, and rosemary, and put on the heads of the principal persons in fêtes. It was formerly held in high esteem as a comforter of the brain, and a strengthener to the memory; and, on the latter account, is considered as the emblem of fidelity in lovers. Formerly, it was worn at weddings, and also at funerals; and it is still grown for that purpose in many parts of the Continent. Many allusions have been made to both customs by poets, and also to its being the symbol of remembrance. Shakspeare makes Ophelia say, "There's rosemary for you: that's for remembrance;" and in the notes to Stevens's edition of Shakspeare are many references to passages referring to this plant in the works of the old poets. It is said to be found wild in the Great Desert; and Moore, in allusion to this, and its use for funerals, says,—

> ——— "The humble rosemary,
> Whose sweets so thanklessly are shed
> To scent the desert and the dead."

The points of the shoots are a most powerful bitter, and they are aromatic; they, also, when distilled with water, yield a thin, light, pale, essential oil, at the rate of 8 oz. of oil to 100 lb. of the herb in a green state. The oil of the flowers (which ought always to be gathered with their calyxes) is somewhat more volatile than that of the leaves, and is readily extracted with spirits of wine. This oil contains a considerable quantity of camphor. The oil of rosemary was in great use among the Greeks and Romans, and still forms an article of the materia medica. Hungary water (so called from being first used by the Queen of Hungary) is made with rosemary, and is considered excellent for keeping the hair in curl. If constantly used, however, the hair will lose its colour, and become wiry. The smell of the plant is fragrant and aromatic; and the taste pungent and bitter. Its properties are effectually extracted by rectified spirit, and partly, also, by water. In France, besides its use by the apothecaries and perfumers, a conserve, a honey, and a liqueur, are made from it by the confectioners. Though the rosemary is indigenous to the south of France, it will scarcely live through the winter, in the open air, in the neighbourhood of Paris; and the varieties, except the broad leaved one, are kept there in the conservatory. In some parts of Germany, especially in the Catholic countries (at Nuremburg, for example), rosemary is cultivated in quantities, in pots, by the commercial gardeners, for the purpose of selling sprigs of it when they come into flower, in winter and early in spring, for religious purposes. (See *Enyc. of Gard.*, edit. 1835, § 545.) Like almost all the plants of this chapter, it is easily propagated by cuttings, and it also ripens seeds in abundance in fine seasons. It is said always to thrive best near the sea;

as is indicated by the name, which is compounded of two Latin words, *ros, marinus*, signifying sea-dew.

Stàchys fruticulòsa Bieb. is a low evergreen shrub, from Caucasus, which seldom grows above 1 ft. in height; but which may be planted where it is desired to include as many species as possible in the arboretum. S. *stenophýlla* Spr., from Spain, and S. *palestìna* L., from Syria, grow about the same height. *Stàchys lavandulæfòlia* is a native of the Levant, and produces its purple flowers in May and August.


1140

Lavándula Spìca L., N. Du Ham., 3. t. 42., and our *fig.* 1140., the common lavender, is a well-known fragrant shrub, which, like the rosemary, has been long an inhabitant of British gardens. In deep, dry, calcareous soils, it will grow to the height of 3 ft., and form a compact hemispherical bush, flowering abundantly every year. The flowers are generally purple, but there is a variety with white flowers; and *L. latifòlia* Ehrh., which is not uncommon in gardens, and which has lilac flowers, though treated by some as a species, is probably nothing more than another variety.

The common lavender is a native of the south of Europe, the north of Africa, and the west of Asia, in warm, rocky, and barren places. It is particularly abundant in Provence; where, as the rosemary, the thyme, and the heath do in other districts, it gives a peculiar flavour to the honey, which is known as the *miel de Provence*, and which, after that of Narbonne, a kind that, as already mentioned, takes the flavour of rosemary, is considered the best in France. The lavender was held in high estimation by the Greeks and Romans, for its fragrance and aromatic properties; and it has been esteemed, on the same account, in Britain, and cultivated in gardens for its medicinal virtues from time immemorial. Medicinally, in the form of tincture, spirit, or essential oil, it is considered a powerful stimulant to the nervous system, and is, consequently, generally had recourse to in headachs and hysterical affections. The odour resides entirely in the essential oil, which is contained in every part of the plant, but principally in its spikes of flowers and flower-stalks, from which the oil is obtained by distillation. This oil, rectified, and again distilled, and mixed with spirits of wine, forms the well-known lavender water of the perfumers. The flowers, on account of their powerful aromatic odour, are frequently put into wardrobes among clothes, as an antidote to moths, particularly in the case of woollen stuffs. A few drops of the oil will serve the same purpose. So powerful are the effects of this oil, that, if a single drop of it be put in a box along with a living insect, the latter almost instantly dies. The lavender is cultivated in various parts of France; and it is so much hardier than the rosemary, that it is grown in quantities for perfumers, even in the neighbourhood of Paris. The driest soil, in the warmest situation, produces most oil; and, as the odour of this plant and the rosemary, as, indeed, of all the Labiàceæ, depends on the disengagement of their oil, of course it is most felt in hot days and during sunshine. The lavender has been long cultivated in the neighbourhood of London, and in other parts of England. Park Place, near Henley on Thames, is celebrated for its lavender plantations, which occupy between 40 and 50 acres. "The plants are raised from cuttings, which are slipped off and prepared by women in the autumn, and bedded in, in rows, in any spare piece of garden ground, where they remain for two years. The ground into which they are to be transplanted, being prepared by shallow trenchings or double ploughing, the plants are placed in rows 4 ft. apart, and at 2 ft. distance in the rows. For three or four years, a row of turnips or potatoes is grown between the rows of lavender; after which period, or about the time that the lavender plants in the rows touch each other, half of them are removed, leaving the field covered with plants 4 ft.

apart every way. All the culture which is required afterwards is, keeping the soil free from weeds. In a few years the plants will have grown sufficiently to touch each other; and in this state they will remain from fifteen to twenty years, according to the nature of the soil: they are then taken up, and the ground cropped for two or three years with turnips and other field crops; after which the lavender plantation is renewed. The flowers are obliged to be either sold to a regularly licensed distiller, or distilled on the premises, on account of the excise laws. The oil from the plantation here is said to be of the best quality; doubtless from the calcareous nature of the soil." (*Gard. Mag.*, ix. p. 661.) Miss Kent, in her *Flora Domestica*, mentions that the stalks of lavender, when stripped of their flowers, form an agreeable substitute for pastiles, and burn very well in the little vessels made for burning pastiles in. (p. 219.) The poets have not quite neglected the lavender. Shenstone, in his *Schoolmistress*, says, —

> " And lavender, whose spikes of azure bloom
> Shall be erewhile in arid bundles bound,
> To lurk amidst her labours of the loom,
> And crown her kerchiefs clean with mickle rare perfume."



1141

a. *A'cynos gravèolens* Link, and A. *rotundifòlia* Pers., the former a native of the Crimea, and the latter of Spain, are small thyme-like shrubs, seldom exceeding 1 ft. in height, which might be placed on rockwork.

Gardoquia Hoókeri Benth., *Swt. Brit. Fl. Gard.*, 2. s. t. 271., is a small upright-branched shrub, with obovate pointed leaves; a native of South Carolina, where it was discovered by Mr. Alexander Gordon, a collector sent out by Mr. Charlwood, and was introduced in 1831. It is a delicate, but showy, little shrub, with brilliant scarlet flowers, and in all probability is half-hardy.



1142

Westringia rosmariniformis Sm., Bot. Rep., t. 214., is a native of New South Wales; introduced in 1791, and producing its pale blue flowers from May till August. It is a very eligible shrub for a conservative wall, from the rosemary-like character of its evergreen foliage. In the conservatory of the Cambridge Botanic Garden, it is 9 ft. high in a pot, and will doubtless grow much higher when trained against a wall.

a. *Sálvia officinàlis* L., N. Du Ham., 6. t. 25., and our *fig.* 1141., is a well-known suffruticose plant, which, though seldom seen above 2 ft. in height, yet, in deep sandy soil, will grow to the height of 5 ft. or 6 ft., and produce a stem as thick as a man's leg. We have seen plants of this size in Donald's Nursery, at Goldsworth, in Surrey; and we have seen hedges of sage on chalky soils, between 3 ft. and 4 ft. high. It is a native of the south of Europe, and has been known in British gardens from time immemorial, and when grown in masses, and abounding in racemes of flowers, it is very ornamental. The virtues of sage have been celebrated from time immemorial. The Latin name of the plant, Salvia, is derived from *salvere*, to heal; and one of the Latin poets asks, "Why should a man die who has sage in his garden?" According to Gerard, "No man needs

to doubt of the wholesomeness of sage ale, being brewed as it should be with sage, scabious, betony, spiknard, squinanth, and fennel seeds." (*Herbal*, p. 766.)

There are several varieties; one of which has the leaves variegated; another has the whole plant of a reddish hue; and one (*fig.* 1142.), common in the neighbourhood of Paris, and of which there are plants in the Horticultural Society's Garden, has leaves larger than those of the species.

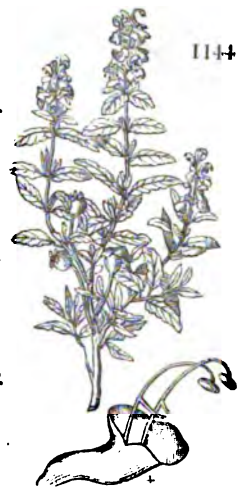
1143



⁂ S. *Hablitziàna Willd.*, *Bot. Mag.*, t. 1429., and our *fig.* 1143., is a native of Siberia, and appears tolerably distinct.

⁂ S. *pomífera* L.; *S.* crética frutéscens pomífera *Tourn.*, *Fl. Græc.*, 1. t. 15.; and our *fig.* 1144.; is a native of Candia; introduced in 1699. This sort of sage is described as growing 4 ft. or 5 ft. high, and having pale blue flowers, like *S.* officinàlis. The branches are liable to be punctured by insects; in consequence of which protuberances are produced as big as apples, in the same manner as galls are produced upon the oak, and mossy excrescences upon the rose tree. Tournefort says the spikes of flowers of this kind of sage are 1 ft. in length, and that the odour of the plant partakes of the common sage and lavender. In the Isle of Crete, the common sage is said to produce the same excrescences as those of *S.* pomífera; and the inhabitants carry them to market there under the name of sage apples.

1144



1145



This circumstance, and some others, induce us to doubt whether pomífera, and several other of the alleged species, natives of the south of Europe, the Levant, and the north of Africa, enumerated in our *Hortus Britannicus*, are any thing more than varieties of *S.* officinàlis. There are various half-hardy species, some of which will be noticed in the Appendix to this chapter.

Audibértia incàna Benth., Bot. Reg., t. 1469., and our *fig.* 1146., is a curious little evergreen shrub, sent from Colombia, in 1827, by Douglas. It grows to the height of 1 ft. or 2 ft., and produces its pale blue flowers from July to September. There are plants in the Horticultural Society's Garden.

App. I. *Half-hardy ligneous or suffruticose Species of Labiàceæ.*

1146



Lavándula Stæ'chas L., Bar. Ic., 301., N. Du Ham., 3. t. 43., and our *fig.* 1149., is an elegant little evergreen shrub, with conspicuous lilac-coloured flowers. It is a native of the south of Europe, and has been known in gardens since the days of Gerard. It is commonly kept in green-houses; but it will pass the winter on dry rockwork, with little or no protection.

L. dentàta L., Bot. Mag., t. 401., and our *fig.* 1146., is a native of Spain; and *L. pinnàta* Bot. Mag., t. 400., and our *fig.* 1147., is a native of Madeira. Both sorts are curious in their leaves, and well deserve a place in collections. *L. víridis* L'Hérit., Fl. Port., 1. t. 4., is a native of Madeira, with purple flowers, which are produced from May to July.

Plectránthus fruticòsus L'Hérit. Sert., 85. t. 41., and our *fig.* 1148., is a native of the forests near the Cape of Good Hope, an old inhabitant of our green-houses, and one of the few green-house plants that were found in old conservatories in France before the Revolution. In that country, among the old orange trees, pomegranates, olives, and oleanders, which are occasionally found lingering about the few old châteaux that still exist, Plectránthus fruticòsus



1147

1148



may be found sometimes 6 ft. or 7 ft. high. In an area of a house in Berkeley Street, there were, in 1836, two plants, about 6 ft. high, and of proportionate bulk. Mr. Bowie, in a very interesting communication to the *Gard. Mag.* on raising Australian and Cape shrubs from seeds, and acclimatising them to Europe, proposes to place the Plectránthus fruticòsus in green-houses, as the most susceptible of cold; which, if properly placed, will prove a warning thermometer to guard against direct injury to others, as it is always the first to suffer, and consequently will show the increasing harm. (*Gard. Mag.*, vol. viii. p. 7.)

1149



Sideritis cándicans Ait., Com. Hort., 2. t. 99., is a native of Madeira, an old inhabitant of green-houses in England, and of orangeries in France, where we have seen it growing about the same height as the Plectránthus fruticòsus. There are several other sorts, from the Canaries, Spain, the Levant, &c., which will be found enumerated in the *Hortus Britannicus*, all of which would probably live on rockwork, with very little protection during winter.

Leonòtis Leonùrus R. Br.; Phlòmis Leonùrus *L., Bot. Mag.*, t. 478.; is a Cape shrub, which has been in the country since 1712. It grows to the height of 3 ft. or 4 ft., and is tolerably hardy. It bears showy scarlet flowers, but does not flower freely in Britain.

Sphácele campanulàta Benth., Bot. Reg., t. 1382, and our *fig.* 1151., is a shrub, from Chili, which grows to the height of 2 ft. or 3 ft., and produces its pale blue flowers in July and August. There is a plant in the Horticultural Society's Garden, which has stood out at the foot of a wall since 1832. S. *Lindleyi Benth.*, *Bot. Reg.*, t. 1226., is another species which was introduced from Valparaiso in 1825.

1151



1150



Dracocéphalum canariénse Com. Hort., 2. t. 41., is an old favourite, much esteemed for its fragrance. Trained against a wall, and protected during winter, it will, in two years, cover a space 4 ft. or 5 ft. high, and 5 ft. or 6 ft. broad; producing its pale purplish flowers in abundance from July to September. It may be raised from seeds early in spring, and turned out in the borders, like a tender annual.

Sálvia spléndens Ker, Bot. Reg., t. 687.; S. *formòsa* Willd., Bot. Mag., 375.; S. *fúlgens* Cav., Bot. Reg., 1356.; and S. *Grahami Benth.*, *Bot. Reg.*, t. 1870., and our *fig.* 1151.; are all splendid suffruticose plants, natives of South America, which will live through the winter against a wall, and flower beautifully during summer; but, though technically shrubs, in practice they are best treated as herbaceous plants, kept in pots and pits, or green-houses, through the winter, and turned out into the open borders in spring. *S.* Gràhami has stood in our garden, in the open border, through the severe winter of 1835-36, without any protection whatever. S. *chamædryòides* Cav. is a dwarf species, the flowers of which are of a peculiarly intense and brilliant blue. It is frequently grown in England for planting out in beds in regular flower-gardens, where its flowers form a mass of beautiful blue. There are some Cape species, which are truly ligneous, that might be tried against a wall. Of these, S. *aùrea* is one of the most splendid.

Prasium màjus L., Fl. Græc., t. 584., is a native of Spain, which has been in the country since the time of Gerard. It grows 3 ft. high, and produces its white-spotted flowers, some of which are followed by pulp-covered seeds, from June to August.

Prostanthèra lasiánthos Lab., Bot. Reg., t. 143., is a native of New South Wales, which has stood in the Horticultural Society's Garden, at the foot of a wall, since 1831; but it was killed in the spring of 1836.

Other half-hardy Species belonging to this order may be found in considerable numbers by looking over the lists in our *Hortus Britannicus*; but, with the exception of the salvias, the phlomises, and the lavandulas, we can hardly recommend any of them for culture, except in the warmer situations of the south of England, where they will grow with little or no protection. Where much labour and expense are required to protect tender plants during winter, only those that are truly ligneous ought to be made choice of; but where the climate is such as to render protection easy, a greater latitude may be allowed.

CHAP. LXXXVII.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER VERBENA'CEÆ.

THIS order, which is closely allied to Labiàceæ, consists chiefly of plants natives of tropical countries; and, among these, the most remarkable is the *Téctona grándis L.*, or teak tree, the oak of India. This tree, Mr. Royle informs us, has been planted as far north as Saharunpore, lat. 29° 57′ N., or about the parallel of the Canary Islands; from which we should think it might be grown in the south of England against a wall.

GENUS I.



VI'TEX L. THE CHASTE TREE. *Lin. Syst.* Didynàmia Angiospérmia.

Identification. Lin. Gen., No. 790.; Reich., No. 853.; Schreb., No. 1060.; Tourn., t. 373.; Juss., 107.; Gærtn., t. 56.; Mill. Icon., t. 275.; N. Du Ham., 6. p. 115.; Lindl. Nat. Syst. Bot., p. 278.; Don's Mill., 4.
Synonymes. Gatillier, *Fr.*; Keuschbaum, *Ger.*
Derivation. From *vieo*, to bind, as with an osier; in reference to the flexibility of the shoots.

Gen. Char., &c. *Calyx* short, 5-toothed. *Corolla* bilabiate; upper lip bifid, lower one trifid; middle segment of the lower lip the largest. *Stamens* 4. didynamous, ascending. *Stigma* bifid. *Drupe* containing a 4-celled nut. *Cells* 1-seeded. (*Don's Mill.*, iv.) — Deciduous shrubs and trees, natives of the south of Europe, India, China, and North America. The only hardy species is a native of Sicily.

✿ 1. V. A'GNUS CA'STUS L. The *officinal, or true*, Chaste Tree.

Identification. Lin. Sp., 890.; Lam. Dict., 2. p. 611.; Don's Mill., 4.
Synonymes. *Elæágnum Theophrásti* Lob. Icon., 2. 138.; *A'gnus castus Blackw.*; Arbre au Poivre, Poivre sauvage, *Fr.*
Engravings. Blackw. Herb., t. 129.; N. Du Ham., 6. t. 35.; and our *fig.* 1152.

Spec. Char., &c. Leaves opposite, digitate, 7—5-lobed: leaflets lanceolate, mostly quite entire, hoary beneath. Racemes terminal, panicled. Flowers verticillate. (*Don's Mill.*, iv.) A shrub, of the height of 5 ft. or 6 ft., which produces its white, bluish white, and sometimes reddish white, flowers in September. It is a native of Sicily, Naples, the north of Africa, and Egypt, and has been in cultivation since 1570. In favourable situations, in the neighbourhood of London, it grows to the height of 8 ft. or 10 ft. The flowers are produced in spikes at the extremities of the branches, from 7 in. to 15 in. in length. In fine seasons, they appear in September, but in bad autumns not till October; and then they never expand freely. Its flowers have an agreeable odour; but the leaves have an unpleasant smell, although aromatic. No seeds are produced in England. The plant received the name of chaste from the Greeks; because, according to Pliny, the Athenian matrons, during the festival in honour of Ceres, called Thesmophoria, when they were dressed in white robes, and enjoined to preserve the strictest chastity, strewed their beds with it. The seeds Bergius states to be carminative; and those of *Vítex trifòlia L.*, a native of India and China, are much used, on this account, by Indian practitioners. The plant grows freely in any soil that is tolerably dry; and it is readily propagated by cuttings, put in in autumn, and protected with a hand-glass. Price of plants, in the London nurseries, 1*s.* 6*d.*; at Bollwyller, 1 franc 50 cents; and at New York, 50 cents.



1152

Variety.

■ V. A. 2 *latifòlia* Mill. (*N. Du Ham.*, vi. p. 116.) has the leaflets broader and shorter than those of the species. The spikes of flowers are shorter, and the flowers are always blue. It is a native of the south of France and Italy, and was known to Lobel and Bauhin. There are plants of it in the Cambridge Botanic Garden.

App. i. *Half-hardy Species of* Vìtex.

V. *incìsa* Lam., Mill. Ic., t. 275. figs. 1. and 2.; *V. Negúndo* Bot. Mag., t. 364.; is a native of China, where it grows to the height of 4 ft., and flowers from July to September. It was introduced in 1758, but is not common in green-houses.

App. I. *Half-hardy Plants of the Order* Verbenàceæ.

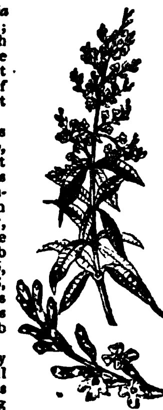


1153

Clerodéndrum inérme R. Br.; Volkamèria inérmis *L.*, *Jacq. Suppl.*, 117. 4. f. 1.; and our *fig.* 1153. This shrub grows, with the greatest vigour, against the wall in the Horticultural Society's Garden, where it has stood since 1829; uninjured by any of the winters that have occurred during that period.

Clerodéndrum speciosíssimum Paxton's Mag. of Bot., 3. p. 217. A branching shrub, growing to the height of 4 ft., with an erect stem, and cordate pointed leaves, and flowers produced in large spreading terminal panicles, of a vivid scarlet colour, and each averaging 2 in. in length, tubular below, with a 5-parted spreading limb. The native country of this plant is not stated; but it is probably Japan. Messrs. Lucomb and Pince of the Exeter Nursery received the plant from Belgium in 1835, and it flowered profusely in their nursery in August and September, 1836, and at Chatsworth in October of the same year. Mr. Paxton describes it as one of the finest plants which he has had the good fortune to figure; and as far superior in beauty to any of the family to which it belongs. Messrs. Lucomb and Pince have a very fine plant in the open border.

Duránta cyánea Hort. is a native of South America, and is generally considered as a hot-house plant; but a plant has stood against the wall in the Horticultural Society's Garden since 1833; and, though the shoots are killed back during the winter season, it always grows vigorously during summer, attaining nearly the height of the wall.



1154

Aloýsia citriodòra Or.; *V*erbèna triphýlla *L'Hérit.*; Líppia citriodòra *Kunth*, *Bot. Mag.*, t. 367.; and our *fig.* 1154.; is a native of Chili, and has been in the country since 1784. In dry soils, in the neighbourhood of London, it will live in the open border for many years, without any protection, except a little litter thrown about the roots; for, though frequently killed down to the ground, it seldom fails to spring up with vigour the following spring, and continue flowering the greater part of the summer. In the Chelsea Botanic Garden, there is a plant against the wall, which in six years has attained the height of 10 ft., growing vigorously, and flowering freely. The leaves are gratefully fragrant when slightly bruised; and on this account, and also on that of its small elegant whitish flowers, it well deserves a place in collections. Of all those shrubs, Dr. Macculloch observes, "which require the protection of a green-house in England, the *V*erbèna triphýlla (Aloýsia citriodòra) is that of which the luxuriance is in Guernsey the most remarkable. Its miserable stinted growth, and bare woody stem, are well known to us. In Guernsey it thrives in exposed situations, and becomes a tree of 12 ft. or 18 ft. in height, spreading in a circle of equal diameter, and its long branches reaching down to the ground on all sides. Its growth is indeed so luxuriant, that it is necessary to keep it from becoming troublesome by perpetual cutting: fresh shoots, 14 ft. in length, resembling those of the osier willow, being annually produced." (*Quayle's Jersey and Guernsey*, Appendix, p. 341.) It is also commonly said that this shrub attains a large size in the Isle of Jersey; but a writer in the *Gardener's Magazine*, vol. xii. p. 551., says that he expected to see it generally cultivated, but that the only plant he saw in the island was one in the garden of a nurseryman, and that not of extraordinary size. The nurseryman, however, told him there were trees in the island with stems as thick as his wrist, and proportionably high.

CHAP. LXXXVIII.

OF THE HALF-HARDY PLANTS OF THE ORDER MYOPO'RINÆ.

Myóporum parvifòlium R. Br., Bot. Mag., t. 1691., is a native of New Holland, with trailing stems and small white flowers, which are produced in great profusion nearly all the year. A plant against our conservative wall at Bayswater lived four years, producing shoots of 5 ft. or 6 ft. in length in one season, which were most beautifully covered with flowers. The plant grows so rapidly, that we have no doubt it would cover many square yards of wall in a very short period. There are other species of the genus having the same habit of growth, more particularly *M. oppositifòlium* R. Br., *M. diffusum* R. Br., and *M. adscéndens* R. Br.

CHAP. LXXXIX.

OF THE HALF-HARDY PLANTS BELONGING TO THE ORDER GLOBULARIA`CEÆ.



1155

Globulària longifòlia L.; G. salícina *Lam.*, *Bot. Reg.*, t. 659.; and our *fig.* 1155.; is a native of Madeira, with long, dark green, shining leaves, and white flowers, which are produced in July and August. It was introduced in 1775; and grows to the height of 3 ft. or 4 ft. in pots, and, doubtless, twice that height, or more, against a conservative wall.

G. Alýpum L., Gar. Aix, fig. 42., the alypo globularia, is a native of the south of Europe, which has been in cultivation in British gardens since 1640. It is a pretty little evergreen shrub, growing to the height of 2 ft., about Aix and Montpelier; and producing its pale bluish flowers in August and September. Like all the plants from that part of Europe, it is easily protected in British gardens in a cold frame, surrounded by turf walls or litter, and covered with mats during severe frosts. It might, therefore, be readily protected on dry rockwork in a warm situation, or at the base of a conservative wall. There is a variety, *G. A. integrifòlium*, a native of the same climate, which is distinguished from the species by having entire leaves.

CHAP. XC.

OF THE HALF-HARDY PLANTS OF THE ORDER PLUMBAGINA`CEÆ.

Státice monopétala L., Boc. Sic., t. 16., is a native of Sicily, where it grows to the height of 3 ft., and produces its fine bluish purple flowers in July and August. S. *suffruticòsa* L. is a native of Siberia, which seldom exceeds 1 ft. in height. Both these species are very suitable for conservative rockwork.

Plumbàgo capénsis Thunb., Bot. Reg., t. 417., is a native of the Cape of Good Hope, with light blue flowers, which it produces in great profusion throughout the summer; and, though it is seldom seen above 5 ft. in height in green-houses, yet we have seen it reach the top of a wall 10 ft. or 12 ft. high, at Bishopstoke Vicarage, in Hampshire. (See *Gard. Mag.*, vol. x. p. 130.)

CHAP. XCI.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER CHENOPODIA`CEÆ.

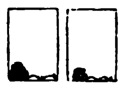
The hardy ligneous species of this order have whitish or glaucous foliage, and small flowers of nearly the same colour: the latter have not a corolla, and are not showy. They are included in three genera; the names and characteristics of which are as follows: —

CHENOPO'DIUM *L.* Flowers bisexual. Calyx inferior, with 5 sepals, permanent. Stamens 5, hypogynous; opposite to, and of about the length of, the sepals. Anthers with round lobes. Ovary orbicular, depressed. Ovule, according to the character of the order, 1, and erect. Styles 2, short. Stigmas obtuse. Fruit a utricle, invested by the calyx. Seed lens-shaped. Leaves alternate, generally lobed, bearing a friable, unctuous scurf. Flowers numerous, small, green, in groups that are disposed in leafy spikes or naked panicles; or the flowers solitary, or 2—3 together, in the axils of leaves. (*Smith Eng. Fl.; Lindley Nat. Syst. of Bot.;* and observation.)

A'TRIPLEX *L.* Flowers some bisexual, some female; those of both kinds upon one plant. — Bisexual flower. Calyx inferior, with 5 sepals, permanent. Stamens 5, hypogynous; opposite to, and about as long as, the sepals. Anthers with round lobes. Pistil and fruit much as in the female flower; but, in Britain, in the native species, seeds are scarcely produced from the bisexual flowers. — Female flower. Calyx inferior, deeply divided into two large, flat, equal, or nearly equal, lobes, and so compressed that the lobes have their inner faces approximate; permanent. Ovary compressed. Ovule, according to the character of the order, 1, and erect. Fruit a utricle, invested by the calyx, which is now enlarged. Seed compressed, orbicular. — Leaves alternate or opposite, undivided or jagged, bearing a meal-like scurf. Flowers numerous, small, greenish, in groups that are axillary or disposed in spikes. (*Smith. Eng. Fl.; Lindley Nat. Syst. of Bot.;* and observation.)

DIO'TIS *Schreb.* Flowers unisexual, those of both sexes upon one plant. — Male flower. Calyx inferior, with 4 sepals, permanent. Stamens 4, inserted at the bottom of the calyx; opposite to, and prominent beyond, the sepals. — Female flower. Calyx inferior, of one piece deeply divided, and ending in 2 horns, permanent, and, possibly, adnate to the ovary. Ovule, according to the character of the order, 1, and erect. Fruit a utricle, villous at the base, partly invested by the calyx. — Leaves alternate, lanceolate, entire, bearing hoary pubescence. Male flowers in axillary groups that are disposed in leafy spikes. Female flowers about 2 together, axillary. (*Encycl. of Plants; Nuttall Gen.; Lindley Nat. Syst. of Bot.;* and observation.)

GENUS I.



CHENOPO'DIUM *L.* THE GOOSEFOOT. *Lin. Syst.* Pentándria Digýnia.

Identification. Lin. Gen., 121., but with some modification since.
Synonymes. Salsòla, *Sp.*; Anserine, *Fr.*; Gause Fuss, *Ger.*
Derivation. From the Greek words *chēn*, a goose, and *pous podos*, foot; many of the species having large angular leaves extremely like the webbed foot of a waterfowl.

Description, &c. A genus of which there are only three ligneous species in British gardens: two of these formerly belonged to the genus Salsòla, or saltwort; and, like the other plants of that genus, they contain a large proportion of soda, more especially in their native habitats, near the sea. The plants are of the easiest culture in any dry soil; and they are readily propagated by cuttings.

■ 1. C. FRUTICO'SUM *Schrad.* The shrubby Goosefoot, *or Stonecrop Tree.*

Identification. Schrader, according to G. Don in Hort. Brit.
Synonymes. Salsòla fruticòsa *Lin. Sp. Pl.*, 324., *Willd. Sp. Pl.*, 1. p. 1316., *Eng. Bot.*, t. 635., *Fl. Græc.*, t. 255., *Eng. Flora*, 2. p. 18., *N. Du Ham.*, 6. p. 263.; the shrubby Glasswort; Soude en Arbre, *Fr.*; strauchartiges Salzkraut, *Ger.*
Engravings. Eng. Bot., t. 635.; Flor. Græc., t. 255.; N. Du Ham., 6. t. 79.; and our *figs.* 1156, 1157.

Spec. Char., &c. Shrubby, upright, evergreen. Leaves semicylindrical, bluntish, imbricate. (*Smith Eng. Fl.*, and *Willd. Sp. Pl.*) This species is a low shrub, seldom exceeding 3 ft. or 4 ft. in height, with numerous cylindrical upright branches; and sessile, linear, fleshy, and alternate leaves, which are



1156

glabrous, and flat on their upper surface, of a very glaucous green, and placed very near each other. The flowers are small, greenish, and axillary; usually solitary. The stamens are generally longer than the divisions of the calyx; and the styles, which are 2—3 in number, are reddish. It is found wild on the shores of the Mediterranean, both in Europe and Africa; and on the sea coasts in England. It is perfectly hardy; and, even when killed down to the ground by severe frost in winter, it is sure to throw up fresh shoots in spring. It is not very ornamental, but is useful, in some situations, as a glaucous evergreen bush. It may be propagated by seeds, layers, cuttings, or suckers. It should be planted in a sheltered situation, as it is an evergreen, and the leaves, from their succulency are easily affected by the frost, which turns them black. The branches are very brittle, and apt to break off: they should not, however, be tied up closely, as the leaves will rot if they are not allowed abundance of light and air.



1157

⊞ 2. C. PARVIFO'LIUM *R. et S.* The small-leaved Goosefoot.

Identification. Rœm. et Schult. Syst. Veg., 6. p. 266.
Synonymes. C. fruticòsum *Bieb.* in *Fl. Taur.-Cauc.*, 1. p. 181., exclusively of all the synonymes; C. microphýllum *Bieb.* in *Suppl. to Fl. Taur.-Cauc.*, 1. p. 275.; Salsòla fruticòsa *Bieb. Casp.*, p. 149. App. No. 22., *Pall. It.*, 3. p. 594.; Suæ̀da microphýlla *Pall. Illust.*, 3. *f.* 44.
Engraving. Pall. Ill., 3. t. 44.

Description, &c. Imperfectly evergreen, frutescent, much branched, spreading, glabrous, about 2 ft. high. Leaves taper, oblong, obtuse, glaucescent, fleshy; the lower half an inch long, the floral ones shorter. Flowers of the shape of those of C. marítimum, three together, attached to the petiole above its base, not bracteated. The sepals that attend the fruit are equal and convex at the back. (*Bieb.*) Frequent in the plains of Eastern Caucasus, towards the Caspian Sea, and near the salt river Gorkaja, where it is believed to be deleterious to horses. (*R. et S. Syst. Vég.*) It was introduced into England in 1825, but is very seldom found in collections.

⊞ 3. C. HORTE'NSE *R. et S.* The Garden Goosefoot.

Identification. Rœm. et Schult. Syst. Veg., 6. p. 268.
Synonymes. Suæ̀da horténsis *Forsk. Ægypt. Arab.*, p. 71.; *Delile Déscr. de l'Egypte.*, No. 297.; Salsòla divérgens *Poir. Enc. Meth.*, 7. p. 299.

Description, &c. Subevergreen. A shrub, about 2 ft. high, very diffuse. Stem, branches, and leaves spotted with white, having upon their surface a mealy matter that may be rubbed off. Leaves flat above, linear, fleshy. Flowers axillary, sessile, in groups. Stigmas 3, united at the base. Calyx, as it attends the fruit, fleshy, diverging. It is very similar to, if not identical with, Salsòla trigyna *Cav.* (*R. et S. Syst. Veg.*) A low uninteresting shrub, a native of Asia, and the south of Europe, supposed to be in British gardens; but we are not certain that we have seen the plant.

GENUS II.



A'TRIPLEX *L.* THE ORACHE. *Lin. Syst.* Polygàmia Monœ'cia.

Identification. Lin. Gen., 745.; Eng. Flor., 4. p. 255.
Derivation. From *ater*, black; according to some by antiphrasis, in reference to the whitish, or mealy, hue of the plants.

Description, &c. Shrubs, with imperfectly woody branches, and succulent leaves, white or glaucous from being covered with a mealy powder. Natives of Britain or the south of Europe, of easy culture and propagation in any common garden soil.

■ 1. *A. HA'LIMUS L.* The Halimus Orache, *or Tree Purslane.*

Identification. Lin. Hort. Cliff., 469.; Gron. Virg., 195.; Roy. Lugdb., 218.; Mill. Dict., No. 2.; Pall. It., 1.; Append. It., 2. p. 477.; Lodd. Cat., ed. 1836.
Synonymes. Hàlimus latifòlius sive fruticòsus *Bauh. Pin.*, 120., *Ger. Emac.*, p. 522.; Hàlimus i. *Clus. Hist.*, 1. p. 53.; the broad-leaved Sea Purslane Tree; Arroche, *Fr.*; strauchartige Melde, *Ger.*
Engravings. Park. Theatr., 724. t. 2.; Ger. Emac., p. 522. f. 1.; and our *fig.* 1158.

Spec. Char., &c. Stem shrubby. Leaves alternate or opposite, their figure partaking of an oblong and a rhomb, entire. (*Willd.*) It inhabits hedges on the coast of Spain, Portugal, Virginia, and Siberia; and was introduced in 1640. An evergreen shrub, which grows about 5 ft. or 6 ft. high, and forms a large broad head. The young branches are covered with a smooth white bark, which becomes grey, and peels off lengthwise, as the tree gets old. The branches are very brittle, and have but little pith. The leaves are soft, white, and silvery, and, in shape, resemble the Greek Δ. The shrub seldom flowers in Britain; but, from its not being quite deciduous, and from the silvery hue of its foliage, it is a valuable plant for shrubberies and other ornamental plantations. It may be propagated by cuttings made in the usual manner, but carefully protected from sparrows, which are so fond of the leaves of this shrub, that "when they once find them out, they will never leave or forsake them, until they have entirely stripped the plants; and though the shrub will shoot out afresh, yet they will as constantly repair to their repast; and will thus continue to prey upon them, until they have entirely destroyed them." (See *Marshall on Planting and Rural Ornament*, vol. ii. p. 29.) It requires a sheltered situation, being liable to injury from frost. Price of plants, in the London nurseries, 1*s*. 6*d*. each.



1158

♣ 2. *A.* PORTULACÖI'DES *L.* The Purslane-like, *or shrubby*, Orache, *or Sea Purslane.*

Identification. Lin. Fl. Suec., 828. 919.; Mill. Dict., No. 3.; Willd. Sp. Pl., 4. p. 957.; Smith Eng. Flor., 4. p. 256.
Synonymes. *Hálimus* secúndus *Clus. Hist.*, 54. f.; *H.* vulgàris *Ger. Emac.*, 523. f.; *Hálimus* seu *Portulàca* marìna *Bauh. Pin.*, 120.; *A'*triplex marítima, *Hálimus* et *Portulàca* marìna dicta, angustifòlia, *Raii Syn.*, 153.; the narrow-leaved Sea Purslane Tree.
Engravings. Eng. Bot., t. 231.; and our *fig.* 1159.

Spec. Char., &c. Stem shrubby, spreading. Leaves opposite, obovate-lanceolate, entire. Flowers generally unisexual; those of both sexes upon one plant. (*Smith Eng. Flor.*) It inhabits the northern shores of Europe; and, in Britain and Ireland, is occasionally found in muddy places by the sea side. It is a low shrub, or trailer, with less silvery leaves than those of the preceding species; the whole plant, also, is much smaller. It may be grown in the open garden, or in pots among alpines. The name of *Hálimus*, given to this and the preceding species by Clusius, has probably been the source of the epithet *halimifòlia*, applied to several other plants; so that *Báccharis halimifòlia*, &c., means that the leaves are glaucous, and resembling those of certain kinds of *A'*triplex.



1159

GENUS III.

DIO'TIS *Schreb.* THE DIOTIS. *Lin. Syst.* Monœ'cia Tetrándria.

Identification. Lin. Gen. Pl., ed. Schreber, No. 1423.; Willd. Sp. Pl., 4. p. 368.; Nutt. Gen. and Cat. N. Amer. Pl., 2. p. 207. It is not the Diòtis of Desf. Fl. Atl.; Dec. Fl. Fr.; Smith Eng. Flor., 3. p. 402.; which is the Otánthus of Link Enum., and the Santolìna marítima *L.*
Synonymes. Ceratöìdes *Tourn.*; A'xyris, *Lin.*; Ceratospérmum *Pers.*

Derivation. From *dis*, twice, and *ous*, *ôtos*, an ear. The calyx of the female flower ends in two segments, which fancy may compare to ears, although they more resemble horns: and this second idea is doubtless that referred to in Tournefort's generic name Ceratöides, from *keras*, a horn, gen. *keratos*, and *eidos*, likeness.

✻ 1. D. CERATÖI'DES *W.* The *two*-horned-*calyxed* Diotis.

Identification. Willd. Sp. Pl., 4. p. 368.
Synonymes. A'xyris Ceratöides *Lin. Sp. Pl.*, 1389.; *Jacq. Icon. Rar.*, 1. t. 189.; Ceratospérmum pappòsum *Pers.*; A'xyris fruticòsa, flóribus fœmíneis lanàtis, *Gmel. Sib.*, 3. p. 17. No. 10. t. 2. f. 1.; Achyránthes pappòsa *Forsk. Descr.*, 48.; Krascheninnikòvia Guildenst. Act. Petrop., 16. p. 548. t. 17.; Urtìca fòliis lanceolàtis, fœminìnis hirsùtus, *Roy. Lugdb.*, 210.; Ceratöides orientàlis fruticòsa Elæágni fòlio *Tourn. Cor.*, 52.; Orientalisches Doppelohr, *Ger.*
Engravings. Jacq. Ic. Rar., 1. t. 189.; Gmel. Sib., 3. p. 17. No. 10. t. 2. f. 1.; Act. Petrop., 16. t. 17.; and our *fig.* 1160.

Description, &c. A shrub, a native of Siberia and Tartary. Introduced in 1780, and producing its obscure apetalous flowers in March and April. It grows 2 ft. or more high, much more across, and abounds in slender spreading branches. Its leaves are lanceolate, narrow, and alternate. The whole plant is hoary. The male flowers are very abundant, and disposed mostly in approximate axillary groups about the terminal part of the branches. The female flowers are less numerous, and mostly upon a lower part of the branch, axillary, and generally two in an axil. Both male and female flowers are sessile, or nearly so. The female flowers are not obvious. The male flowers are not showy; though their number, grouped character, and the yellow anthers prominent from them, render the flowering of the shrub obvious. They have a slight scent of a honey-like sweetness. The stocky part of this plant is persistently ligneous. D. Ceratöides thrives in a light soil, and is easily propagated by layers, or by cuttings inserted in the soil and kept covered with a hand-glass. Plants in the Cambridge Botanic Garden, in August, 1836, growing, some in calcareous soil, and one or more in heath mould, were about 2 ft. high, and with widely spreading recumbent branches. This shrub, therefore, appears particularly well adapted for rockwork; and, if gardens were laid out with a view to the geographical or topographical distribution of plants, the D. Ceratöides, with the different species of Nitrària, Callígonum, &c., would form suitable species for the rockwork of Siberia.



1160

✻ 2. *D. lanàta* Pursh Fl. Amer. Sept., 2. p. 602., Nutt. Gen. N. Amer., 2. p. 207., resembles D. Ceratöides, but is easily distinguished, at first sight, by the long, woolly, white tomentum which pervades all its parts. The stem is zigzag. The groups of flowers are so crowded as to produce the resemblance of spikes.

App. I. *Half-hardy Species of Chenopodiàceæ.*

Anábasis tamariscifòlia L., Cav. Ic., 3. 293., is a curious little salsola-like plant, a native of Spain, where it grows 2 ft. high. It was introduced in 1752; but, being of little interest, except to the botanist, it is rarely to be met with even in botanic gardens. *A. aphýlla* L., Salsòla articulàta *Forst.*, is another plant of the same genus, a native of Asia Minor.

Kòchia prostràta Schr., Jacq. Au., 3. 294.; Salsòla prostràta *L.*; is a native of the south of Europe, growing to the height of 5 ft., with the general habit of a salsola. It is almost sufficiently hardy to stand in the open air without protection. A plant in the Cambridge Botanic Garden, in a partly open border, is a freely growing shrub, about 5 ft. high, with its lower branches prostrate, and its upper ones drooping. It is clothed with abundance of narrow, pointed, pubescent leaves, which are a little canescent.

Bòsea Yervamòra *L.*, *Walt. Hort.*, 24. t. 10., *Encyc. of Plants*, f. 3453., is a native of the Canaries, where it grows to the height of 8 ft. or 10 ft. A plant in the Horticultural Society's Garden has stood out since 1834, against a wall. It is generally killed to the ground during winter, but grows up again vigorously during summer, and usually reaches from 5 ft. to 6 ft. high.

Camphorósma monspelìaca Schk. Hand., 1. t. 26., is a low heath-like shrub, a native of the south of Europe, common in various places in France; for instance, at Avignon, on the ruins of the old castle. It is of a decumbent habit, with red bark to its young shoots, and with hairy narrow-pointed leaves, in groups along the branches. It is a most desirable plant for conservative rockwork; and if trained against a wall, we have no doubt it would cover several square yards of wall in a very short time.

Other Genera belonging to Chenopodiàceæ contain species which may be reckoned half-hardy; but as they may be readily found by turning to the enumeration in our *Hortus Britannicus*, we do not give them here.

CHAP. XCII.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER POLYGONA'CEÆ.

Distinctive Characteristics. Leaves alternate. A filmy cylindrical sheath, called an ochrea (which signifies a boot), arises from the base of every leaf, except in three genera, and surrounds the stem or branch for more or less of the interval between that leaf and the next above it. Generally speaking, this is sufficient to distinguish the *P*olygonàceæ from all other plants. Additionally, they have an erect ovule, with a superior radicle, and, in most, farinaceous albumen. (*Lindley Nat. Syst. of Bot.*) The hardy ligneous species are included in the three genera, Tragopýrum *Bieb.*, *A*trapháxis *L.*, and Callígonum *L.*; which have the following characters.

Tragopy'rum *Bieb.* Calyx inferior, with 5 sepals, that are imbricate in æstivation, permanent; the 2 exterior smaller, the 3 interior investing the fruit, which is an achenium that is 3-cornered in a transverse section of it. Stamens 8. Styles 3. Undershrubs, with the habit of *A*trapháxis, but decumbent or trailing; and the leaves of one of the species, at least (T. *b*uxifòlium *Bieb.*), are deciduous. In the stamens and pistil they resemble *P*olýgonum, and in the calyx *R*ùmex. (*Bieb. Fl. Taur-Cauc.*, iii. p. 284.; *Lindley Nat. Syst. of Bot.*; and observation.) Pedicels jointed in T. lanceolàtum *Bieb.* and T. polýgamum *Spr.* (*Vent.*)

*A*trapha'xis *L.* Calyx inferior, of 4 leaves, in an outer smaller pair and an interior pair, the latter resembling petals; or 4-parted, with the lobes equal. Stamens 6. Stigmas 2, in one species; style bifid, in the other. Fruit compressed, in one species; roundish, in the other. Seed 1. — Species 2. Small shrubs, with leaves more or less ovate. (*Willd. Sp. Pl.*, 2. p. 248, 249., and obs.)

Calli'gonum *L.* Calyx inferior, persistent, turbinate in the lower part, ending upwards in a 5-parted spreading border; the 2 outer lobes rather the smaller. Stamens about 16; the filaments slightly united at the base, and then diverging. Anthers peltate. Germen 4-sided, acuminate. Styles 4 or 3, united at the base for a little way, slender, spreading. Stigmas capitate. Fruit an achenium that has 4 sides and 4 wings; and the wings are either membranous, longitudinally 2-parted, toothed, and curled, or rough with branched bristles. C. Pallàsii, the best-known species, is an erect shrub 3 ft. or 4 ft. high, with rush-like shoots, without obvious leaves, with the flowers in groups, and their calyxes partly white. (*L'Héritier* in *Lin. Soc. Trans.*, i. p. 177.; and *Rees's Cyclop.*)

Genus I.

TRAGOPY'RUM *Bieb.* The Goat Wheat. *Lin. Syst.* Octándria Trigýnia.

Identification. Bieb. Flor. Taurico-Caucas., 3. p. 284.
Synonyme. Polýgonum *Lin. Hort. Ups.*, 95., *Willd. Sp.*, 2. p. 440., *Bot. Mag.*, t. 1065., *Bot. Reg.* t. 255.
Derivation. *Tragos*, a goat, and *puros*, wheat. The 3-cornered fruits of such of the *P*olygonàceæ as have them are comparable, with some allowance, to wheat; and goats may feed upon those of the Tragopýrum, or upon the shrubs themselves; or it may be that the name has been invented as one readily distinctive from the name Fagopýrum, now the name of a genus that includes the different kinds of buck-wheat.

♄ ✻ 1. T. lanceola'tum *Bieb.* The lanceolate-*leaved* Goat Wheat.

Identification. Bieb. Fl. Taurico-Caucas.
Synonymes. Polýgonum frutéscens *Willd. Sp. Pl.*, 2. p. 440., *Willd. Baumz.*, p. 286., *Bot. Reg.*, t. 254.; strauchartiger Knöterig, *Ger.*
Engravings. Gmel. Sib., 3. t. 12. f. 2.; Bot. Reg., t. 254.; and our *fig.* 1161.


1161

Spec. Char., &c. Stem spreading widely. Leaves lanceolate, tapered to both ends, flat. Ochrea lanceolate, shorter than the internode. The 2 exterior sepals reflexed, the 3 interior ones obcordate. Flowers octandrous, trigynous. A native of Siberia and Dahuria. (*Willd.*) A shrub, a native of Siberia, growing from 1 ft. to more than 2 ft. high, branchy, even to the base. Introduced in 1770, but rare in collections. Branches twiggy. Leaf with a frosty hue, spathulate-lanceolate, nearly 1 in. long, several times longer than broad; its edge obscurely indented. The petiole short. The ochrea ends in 2 acuminate points. The flowers are borne on terminal twigs, are pediceled, erect, axillary, 1—3 in an axil, often 3, and are so disposed as to constitute leafy racemes. The calyxes are whitish, variegated with rose colour, and persistent; and of the 5 sepals to each flower, the 3 that invest the ovary after the flowering become more entirely rosy. The pedicels, erect while bearing the flower, after the flowering become deflexed, and render the fruit pendulous. (*Bot. Reg.*) There is a plant in the Horticultural Society's Garden, in an unfavourable situation, being much shaded by trees, which is upward of 1 ft. in height; and there is one in the arboretum of Messrs. Loddiges, which forms a hemispherical bush 2½ ft. high; which, during great part of July and August, 1836, was covered with its beautiful white flowers, tinged with pink; and formed a truly admirable object. It thrives best in peat soil, and is worthy of a prominent place in the most select collections.

✱ 2. T. BUXIFO`LIUM *Bieb.* The Box-leaved Goat Wheat.

Identification. Bieb. Fl. Taurico-Caucas.
Synonymes. Polýgonum críspulum var. α *Sims Bot. Mag.*, t. 1065.; *P.* caucásicum *Hoffmannsegg.*
Engravings. Bot. Mag., t. 1065.; and our *fig.* 1162.

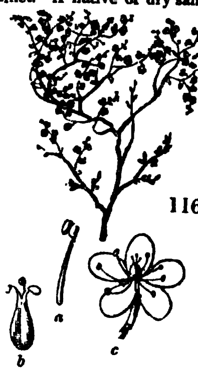

1162

Spec. Char., &c. Leaf obovate, obtuse, tipped with a short mucro; the lateral margins undulated and reflexed, glabrous. Ochreas with 2 awns. (*Sims* in *Bot. Mag*, t. 1065.) A shrub, a native of Siberia. Introduced in 1800, and flowering in July. Its decumbent branches will extend 2 ft. and upwards on every side of the root; their bark is ash-coloured. The leaves are of a light green colour, rather rounded in outline, about 1 in. in diameter, and deciduous. The flowers are produced in long racemes, are nodding, and white. The fruit is enclosed by the 3 inner sepals, which become, as the fruit ripens, of a rosy colour. This, and the preceding species, are extremely interesting and beautiful little shrubs, and it is much to be regretted that they are so very seldom seen in collections. Though they require heath soil, and some little time to be firmly established, yet when once they are so, from their compact neat habit of growth, very little care will be necessary afterwards. They never can require much pruning, are quite hardy; and, provided the soil be not allowed to get too dry in the heat of summer, they are always certain of flowering freely. We hope in due time to see our provincial horticultural societies encouraging the growth of plants of this kind, by offering premiums for well grown specimens; and for those who collect the greatest number of sorts.

✱ 3. T. POLY´GAMUM *Spr.* The polygamous-*sexed* Goat Wheat.

Identification. Spreng. Syst. Veg., 2. p. 251.
Synonymes. Polýgonum polýgamum *Vent. Cels*, t. 65.; *P.* parvifòlium *Nutt. Gen.*, 1. p. 256.
Engravings. Vent. Cels., t. 65.; and our *fig.* 1163.

Spec. Char., &c. Leaves spathulate-linear. Ochreas lanceolate, shorter than the internodes. Flowers in branched racemes, whose rachises are thread-shaped. Styles distinct. A native of dry sandy wastes in Carolina. Introduced in 1810, and flowers in July and August. (*Spreng.*) T. polýgamum *Spr.* differs from T. lanceolàtum *Bieb.*, especially in the following points: stem very much branched; leaf spathulate; sexes polygamous; sepals expanded during the flowering; and ochreas entire at the top. The polygamous condition of the sexes consists in the flowers of the same plant being some bisexual, some female. (*Vent.*) It is a shrub less than 1 ft. high. Its stem is upright, of the thickness of a raven's quill, cylindrical, and bears in its upper part numerous slender ramified branches, that are disposed so as to form a bushy head. The stem, branches, and branchlets are of a brown colour, and all bear ochreas of this colour, and that are striated, membranous at the tip, truncate on one side, and end lanceolately on the other. The leaves are spathulate, reflexed, glabrous, less than half an inch long, a fourth of their length broad, and of a delicate green colour. The flowers are small, of a greenish white colour, disposed in racemes that are axillary and terminal; and they together give the appearance of a globose panicle. The rachis of the raceme bears ochreas. The pedicels have each a joint. (*Vent. Cels.*) We have not seen the plant. In *fig.* 1163. *a* is a stamen, *b* the pistil, and *c* the bisexual flower.



1163

T. púngens Bieb., *T. gláucum* Spr., *T. grandiflòrum* Bieb., are described by botanists, but not yet introduced.

Genus III.



*A*TRAPHA'XIS *L.* The Atraphaxis. *Lin. Syst.* Hexándria Digýnia.

Identification. Schreb. Lin. Gen., No. 612.; Willd. Sp. Pl., 2. p. 248.
Derivation. According to some from *a* privative, and *trephō*, to nourish; in allusion to the fruit, which, though in form like that of the buck wheat, is unfit for food; according to others, *para to athroos auxein*, from its coming up quickly from seed, viz. on the eighth day.

1. *A.* spino'sa *L.* The spine-*branched* Atraphaxis.

Identification. Lin. Hort. Cliff., 138.; Mill. Dict., No. 1.; L'Hérit. Stirp. Nov., 1. p. 27. t. 14.; Willd. Sp. Pl., 2. p. 248.; Wats. Dend. Brit., t. 119.
Synonyme. *A'triplex orientàlis, frùtex aculeàtus, flòre púlchro, Tourn. Cor.*, 83.
Engravings. L'Hérit. Stirp. Nov., 1. t. 14.; Buxb. Cent., 1. t. 30.; Dill. Elth., t. 40. f. 47.; Wats. Dend. Brit., t. 119.; and our *fig.* 1164.

Spec. Char., &c. Some of its branches resemble spines, and this character distinguishes it from the other species, *A.* undulàta, and is implied in the epithet spinòsa. In the following description, most of its characters are noted: — A shrub, of about 2 ft. high, upright, with most of the branches directed upwards, but with some horizontal, and some a little deflexed. The horizontal and deflexed ones are the shorter, and, when leafless, have the appearance of spines. Watson has attributed (*Dend. Brit.*) this to their tips being dead: and the case seems to be so. The bark of the year is whitish; that of older parts is brown. The foliage is glaucous. The flowers are white. The leaves are about half an inch long, many less. The disk ovate-acute; the petiole short. The flowers are borne a few together about the tips of shoots of the year; each is situate upon a slender pedicel, that has a joint about or below the middle, and arises from the axil of a bractea. The calyx is of 4 leaves that are imbricate in æstivation. The 2 exterior are smaller, opposite, and become reflexed. The 2 interior are opposite, petal-like, horizontal during the flowering, afterwards approximate to the ovary, which is flat, and has one of the approximate sepals against each of its flat sides. Stigmas 2, capitate. Stamens connate at the base, into a short disk that surrounds the base of the ovary. (Observation, and *Willd. Sp. Pl.*, and *Wats. Dend. Brit.*) Indigenous near the Caspian Sea, and in the Levant, and flowering in August. It was introduced in 1732, but is rare in collections. There is a fine plant in the arboretum of Messrs.

1164



Loddiges, upwards of 2 ft. high, which was profusely covered with white flowers, tinged with pink, in August, 1836. It frequently ripens seeds there; but no plants have hitherto been raised from them. There is also a plant in the Chelsea Botanic Garden. It thrives best in sandy peat, and is propagated by layers. So elegant and rare a plant deserves a place in every choice collection.

2. *A.* UNDULA'TA *L.* The waved-*leaved* Atraphaxis.

Identification. Lin. Hort. Cliff., 137.; Willd. Sp. Pl., 2. p. 249.
Engraving. Dill. Elth., t. 32. f. 36.

Spec. Char., &c. It is less rigid than the *A.* spinòsa, and has not a spiny character. Its leaves are ovate, waved at the edges, and of a greener hue. The calyx is 4-parted, and has the lobes equal, ovate, and concave. Stamens lanceolate. Style bifid. Fruit roundish. (Observation, and *Willd. Sp. Pl.*) A native of the Cape of Good Hope, whence it was introduced in 1732, but is rare in collections. In British green-houses, it flowers in June and July; and, when planted out in the open garden, it will produce shoots from subterraneous stolones. We have not seen the plant.

GENUS IV.

CALLI'GONUM *L.* THE CALLIGONUM. *Lin. Syst.* Dodecándria Tetragýnia.

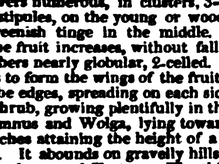
Identification. Lin. Gen., 680.; L'Héritier in Lin. Soc. Trans., 1. p. 177.; Willd. Sp. Pl., 2. p. 926.
Synonymes. Pallàsia L., Pterocóccus *Pall.*
Derivation. *Kallos*, beauty, *gonu*, a knee; in description of the neat and jointed character of the branches.

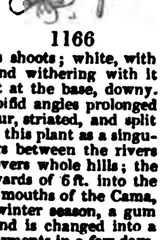
1. C. PALLA'SIA L'Herit. Pallas's Calligonum.

Identification. L'Hérit. Stirp., 2. p. 37., and in Lin. Soc. Trans., 1. p. 177.; Ait. Hort. Kew., 2. p. 242.; Willd. Sp. Pl., 2. p. 927.
Synonymes. Pterocóccus aphýllus *Pall. Voy.*, 2. p. 738. t. 8.; Callígonum polygonöìdes *Pall. Itin.*, 3. p. 536.; Pallàsia cáspica *Lin. fil. Suppl.*, 252., *Savigny* in *Encycl.*; Pallàsia Pterocóccus *Pall. Fl. Ross.*, 2. p. 70. t. 77, 78.; Caspischer Hackenknopf, *Ger.*
Engravings. Lam. Ill., 410.; Pall. Itin., 2. t. 81.; Pall. Fl. Ross., 2. t. 77, 78.; and our *figs.* 1165, 1166.

Spec. Char., &c. Fruit winged: wings membranous, curled, and toothed. (*L'Hérit.* in *Lin. Soc. Trans.*) A shrub, 3 ft. or 4 ft. high. Introduced in 1780, but rare in collections. In its native state, on the banks of the Caspian Sea, its root is thick, woody, 1½ in. in diameter, striking deep into the sand, with a tuberose head. Stems numerous, about the thickness of a finger, erect, branched, spreading, dichotomous, brittle, with a grey striated bark. Branches alternate, round, zigzag, pointed, a little knotty; without leaves; putting out every spring, at each joint, from 6 to 10 close-set, herbaceous, rush-like shoots, sometimes simple, sometimes branched, of a fine green and nearly glaucous colour; a few of which survive the winter, and harden into branches; the rest perish and leave a knotty scar. Stipule membranous, obscurely trifid, shriveling, surrounding the joint, as in the polygonums. Leaves alternate, sessile, solitary, at each joint of the herbaceous shoots; round, awl-shaped, fleshy, resembling the shoots; half an inch long. Pallas says there are no leaves; but L'Héritier affirms they were actually present in plants cultivated by himself, which were bearing flowers and fruit. Flowers numerous, in clusters, 3—5 in a cluster, lateral, or axillary within the stipules, on the young or woody branches, as well as on the herbaceous shoots; white, with a greenish tinge in the middle. Stamens 16, the length of the calyx, and withering with it as the fruit increases, without falling off. Filaments bristle-shaped, thickest at the base, downy. Anthers nearly globular, 2-celled. Ovary conical, 4-sided, rarely 3-sided, the bifid angles prolonged so as to form the wings of the fruit. Wings somewhat oval, of a crimson colour, striated, and split on the edges, spreading on each side so as to conceal the nut. Pallas describes this plant as a singular shrub, growing plentifully in the Desert of Naryn, and in the sandy tracts between the rivers Rhymnus and Wolga, lying towards the Caspian Sea, where it frequently covers whole hills; the branches attaining the height of a man, and the roots often descending upwards of 6 ft. into the sand. It abounds on gravelly hills near the Wolga, at Astracan, and near the mouths of the Cama, in the deserts of Tartary. The thick part of the root being cut across in the winter season, a gum exudes, having the appearance of tragacanth. Infused in water, it swells, and is changed into a sweetish mucilage, which does not soon grow dry; and, if exposed to heat, ferments in a few days, and acquires a vinous flavour. The wandering tribes form tobacco-pipes and spoons from the knots found upon the trunk. The smoke of the wood is said to be good for sore eyes. The fruit is succulent, acid, and excellent for quenching thirst. The flowers are produced in May, and the fruit ripens in July. The nuts germinate freely when sown deeply in sand, and the two seed-leaves break forth, and suddenly spring up, in one night, 1 in. in length, and thread-like and decumbent; but they become speedily erect.

1165





1166

C. ossmium L'Hérit. in Lin. Trans., 1. p. 180., Willd. Sp. Pl., 2. p. 927.; and *C. Pánderi L'Hérit.*; are described by botanists, and registered in *Sweet's Hortus Britannicus* as introduced; but we are not aware of their being in the country.

App. I. *Half-hardy Species of* Polygonàceæ.



1167

Brunnichia cirrhòsa Gærtn. Fruct., 1. t. 45. f. 2., is a tendriled climber, a native of Carolina, with alternate, cordate, acuminate leaves, and flowers in panicled racemes. It was introduced in 1787, and is occasionally met with in old collections; for example, in the Cambridge Botanic Garden.

Rùmex *Lunària* L., Pluk. Alm., 252, 253., is a native of the Canaries, with roundish glaucous leaves, which has been occasionally found in green-houses, since the days of Parkinson. It grows to the height of 5 ft. or 6 ft. in the Cambridge Botanic Garden; and produces its greenish flowers in June and July. There are two other African suffruticose species recorded in our *Hortus Britannicus*; and there is a plant in the Horticultural Society's Garden, from Moldavia, which has twining stems, and of which a portion is represented in *fig.* 1167. It grows against a wall with an east aspect, and, though frequently killed down during winter, never fails to spring up vigorously the following spring.

Polýgonum adpréssum R. Br., Bot. Mag., t. 3145., the Macquarrie Harbour vine, is a native of Van Diemen's Land, principally on the sea shore, about Macquarrie Harbour. It is an evergreen climber or trailer, growing to the height of 60 ft.; flowering from May to August; and ripening its fruit in December and January. The flowers are axillary, and are succeeded by racemes of fruit, which, at first sight, resemble grapes. "The seed of all the polygonums, which is a small hard nut, is known to be wholesome, (buck-wheat, for example); but in *P.* adpréssum the seed is invested with the enlarged and fleshy segments of the calyx, which gives to each fruit the appearance of a berry: some acidity in this fruit renders it available for tarts." (*Bot. Mag.*, April, 1832; see also *Gard. Mag.*, vol. viii. p. 347., and vol. xi. p. 341.) This plant was introduced in 1822; and, though considered as requiring the green-house, yet we have little doubt it would live against a conservative wall, or as a trailer on dry rockwork, in peat soil, in a warm situation. The extraordinary rapidity of its growth might perhaps recommend it for the same purposes as the cobœa, and other rapid-growing climbers.

CHAP. XCIII.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS OF THE ORDER *LAURA'CEÆ*.

This order is distinguished from all others by the following short characteristics: — Anthers opening by valves which curve upwards; carpels solitary and superior; and ovules pendulous. (*Lindl. Nat. Syst. of Bot.*) The only other order treated of in our work, in which there is an analogous mode of opening in the anthers, is *Berberàceæ*. The species are chiefly trees, some of them shrubs, natives of Asia and North America, and one of them of the south of Europe.

Genus I.



LAU'RUS *Plin.* The Laurel, *or* Bay, Tree. *Lin. Syst.* Enneándria Monogýnia.

Identification. Pliny, on the authority of C. G. Nees von Esenbeck in Lindl. Nat. Syst. of Bot., p. 202.; Lin. Gen., No. 503., in part; and so of most other botanical authors.
Synonymes. *Sássafras* and *Benzòin*, C. G. Von Esenbeck; Daphnē, *Greek*.
Derivation. From *laus*, praise; in reference to the ancient custom of crowning the Roman conquerors with laurel in their triumphal processions. There appears some doubt of the *Laúrus nóbilis* being the Laurus of the Romans, and the Daphnē of the Greeks. (See *Dáphne*.) As, however, nothing certain is known of the subject, we have followed the popular belief; and, in the history given below of the *Laúrus nóbilis*, we have treated it as if identical with the Daphnē of the Greeks.

Gen. Char., &c. *Sexes* polygamous, or diœcious. *Calyx* with 6 sepals. *Stamens* 9; 6 exterior, 3 interior, and each of them having a pair of gland-like bodies

attached to its base. These last have been deemed imperfect stamens. *Anthers* adnate; of 2 cells in most of the species, of 4 unequal ones in the others: each cell is closed by a vertical valve that opens elastically, and often carries up the pollen in a mass. *Fruit* a carpel that is pulpy externally and includes one seed. *Cotyledons* eccentrically peltate, or, in other words, attached to the remainder of the embryo a little above their base line; as, according to Brown, is the case in all *Lauràceæ*. — Species about 9. Trees or shrubs. Leaves alternate, deciduous, or persistent in 4 species, entire, or lobed. Flowers, of the kinds having deciduous leaves, appearing before the leaves, in small conglomerate umbels; or, in *L. Sássafras* L. and *L.* álbida *Nutt.*, in conglomerate bracteate racemes. (*Nuttall* chiefly.) *L.* carolinénsis *Catesby* is an evergreen species of the United States. *L.* nóbilis *W.* is an evergreen species of Italy. The latter has fragrant leaves. Most of the American kinds have fragrant bark, and their groups of flowers attended by the scales of the buds that had included them. (*Sims* in *Bot. Mag.*) The genus *Laúrus L.* has been divided, and several genera formed out of it; but all the hardy species are here retained under the generic name of *Laúrus*. There are only three perfectly hardy species, *Laúrus* nóbilis, *L. Sássafras*, and *L. Benzòin*, but there are several that will live in the open air in mild climates, or with a little protection.

A. *Plants evergreen; hardy.*

■ ♀ 1. *L.* NO'BILIS *L.* The noble Laurel, *or Sweet Bay.*

Identification. Lin. Sp., 529.; Hort. Cliff., 155.; Mill. Dict., No. 1.; Martyn's Mill., No. 9.; Willd. Sp. Pl., 2. p. 479.; Lodd. Cat., ed. 1836.
Synonymes. Laúrus *Camer., Tourn., Dodon., Ray*; *L.* vulgàris *Bauh. Pin.*, 460.; Laurier commun, Laurier franc, Laurier d'Apollon, Laurier à sauce, *Fr.*; gemeine Lorbeer, *Ger.*
Engravings. Blackw. Herb., t. 175.; Flor. Græc., t. 365.; and the plate in our last Volume.

Spec. Char., &c. Evergreen. Flowers 4-cleft. Sexes diœcious. Leaves lanceolate, veiny. A native of Italy and Greece. (*Willd. Sp. Pl.*, ii. p. 480.)

Varieties.

- ■ L. *n.* 2 *undulàta* Mill. is a low shrub, seldom growing higher than 4 ft. or 6 ft., with leaves waved on the edges, which is stated in the *Nouveau Du Hamel* to be hardier than the species.
- ■ L. *n.* 3 *salicifòlia* Swt., *L.* n. angustifòlia *Lodd. Cat.*, is a shrub, rather higher than the preceding variety, with long narrow leaves, not so thick as those of the species, and of a lighter green.
- ■ L. *n.* 4 *variegàta* Swt., *L.* n. fòl. var. *Lodd. Cat.* — Leaves variegated.
- ■ L. *n.* 5 *latifòlia* Mill. has the leaves much broader and smoother than those of the species. This is the broad-leaved bay of Asia, Spain, and Italy, and it is generally considered as too tender for the open air in England.
- ■ L. *n.* 6 *críspa* Lodd. Cat. has the leaves somewhat curled.
- ■ L. *n.* 7 *flòre plèno* N. Du Ham. has double flowers.

There are also occasionally variations, such as the stamens varying in number, and the stamens being sometimes expanded flat.

Description, &c. An evergreen tree, or rather enormous shrub, sometimes growing to the height of 60 ft., but always displaying a tendency to throw up suckers; and rarely, if ever, assuming a tree-like character. The leaves are evergreen, and of a firm texture; they have an agreeable smell, and an aromatic, subacrid, slightly bitterish taste. The flowers are diœcious, or the male and female on different trees, and are disposed in racemes shorter than the leaves. The male tree is the most showy, from the greater proportion of yellow in the flowers. The berry is ovate, fleshy, and of a very dark purple, approaching to black. The sweet bay tree is a native of the south of Europe, and the north of Africa, where its general height is about 30 ft. St. Pierre observes that the wild bay trees on the banks of the river Peneus in Thessaly are remarkably fine, which might probably give rise to the fable of Daphne (supposing the Greek daphnē to be this tree) being a nymph, the daughter of that river,

Pallas mentions having found it in Tauria. The exact date of its introduction into Britain is unknown, but it must have been previous to 1562, as it is mentioned in Turner's *Herbal*, published in that year; and we find that, in the reign of Elizabeth, the floors of the houses of distinguished persons were strewed with bay leaves. It was formerly considered medicinal, both leaves and berries being highly aromatic and stomachic; they are also astringent and carminative. An infusion of them was not only considered beneficial, when taken internally, but it was used for fomentations, &c. At present, the principal use of the tree is as an ornamental plant, though the leaves are still employed for flavouring custards, blancmange, &c. In mythology this tree is celebrated as having once been Daphne, the daughter of Peneus, who, flying from the embraces of Apollo, and reaching the banks of her parent stream, called on the river god for aid, and was changed into a laurel. In the age of Roman greatness, this tree was considered as the emblem of victory, and also of clemency. The victorious generals were crowned with it in their triumphal processions; every common soldier carried a sprig of it in his hand; and even the dispatches announcing a victory were wrapped up in, and ornamented with, leaves of bay. The aromatic odour of these trees was supposed by the ancient Romans to have the power of dispelling contagion, and during a pestilence the Emperor Claudius removed his court to Laurentine, so celebrated for its bay trees. Theophrastus tells us that superstitious Greeks would keep a bay leaf in their mouths all day, to preserve themselves from misfortunes. The Greeks had also diviners who were called Daphnephagi, because they chewed bay leaves, which they pretended inspired them with the spirit of prophecy. The bay was dedicated to Apollo, and the first temple raised to that god at Delphi was formed of the branches of the tree. It was the favourite tree of the poets: and we are told that Maia, the mother of Virgil, dreamt that she was delivered of a bay tree; and that one of these trees sprang from Virgil's ashes, and is still growing over his tomb. In later times it was supposed to be a safeguard against lightning; and Madame De Genlis mentions the device of the Count De Dunois, which was a bay tree, with the motto "I defend the earth that bears me." It was a custom in the middle ages, to place wreaths of laurel, with the berries on, on the heads of those poets who had particularly distinguished themselves; hence our expression, poet laureate. "Students who have taken their degrees at the universities are called bachelors, from the French *bachelier*, which is derived from the Latin *baccalaureus*, a laurel berry. These students were not allowed to marry, lest the duties of husband and father should take them from their literary pursuits; and, in time, all single men were called bachelors." (*Sylva Flor.*, i. p. 115.) This tree is mentioned by Chaucer as the crown of the Knights of the Round Table.

Soil, Propagation, &c. The *Laúrus* nóbilis requires a good free soil, and it will not thrive in the open air, in a climate much colder than that of the environs of London. It is generally propagated by layers; but as the berries are ripened in the south of England, and can be had in abundance from France, the species is very generally increased from seeds, and the varieties only raised from layers or cuttings. As an evergreen shrub, not only beautiful in itself, but connected with many classical and interesting associations, it ought to have a place in every collection. As it forms a dense conical bush, when not trained to a single stem, it is well adapted for garden hedges. This tree is very tenacious of life, and the root or stump of an apparently dead tree will often send up suckers two years after it has appeared to be dead.

Statistics. Laúrus nóbilis in the Environs of London. There are plants upward of 20 ft. high, at various places, the largest of which, that we have seen, is a plant at Syon 28 ft. high, forming an immense conical bush, 18 ft. in diameter at the base. The rate of growth in the neighbourhood of London, as deduced from the dimensions of several young plants sent us, is about 15 ft. in height, in 10 years.

Laúrus nóbilis South of London. The largest tree of this species in England is at Margram in Glamorganshire, the seat of C. P. Talbot, Esq., M.P., about 12 miles from Swansea. It is 61 ft. 6 in. high, and forms a magnificent bell-shaped bush, about 60 ft. in diameter at the base. In Devonshire,

at Killerton, 90 years planted, it is 26 ft. high, the diameter of the trunk 1 ft. In Somersetshire, at Nettlecombe, 70 years planted, it is 22 ft. high, the diameter of the trunk 20 in., and of the head 39 ft. In Surrey, at Claremont, 25 ft. high, as a bush, the branches covering a space 15 ft. in diameter. In Sussex, at Arundel Castle, it is 25 ft. high.

Laùrus nóbilis North of London. In Bedfordshire, at Southhill, 22 years planted, it is 10 ft. high. In Berkshire, at White Knights, 30 years planted, it is 13½ ft. high. In Cheshire, at Kinmel Park, 20 years planted, it is 18 ft high; at Eaton Hall, 14 years planted, it is 9 ft. high, and the diameter of the space covered by the branches 10 ft. In Shropshire, at Willey Park, 10 years planted, it is 12 ft. high. In Suffolk, at Finborough Hall, 60 years planted, it is 20 ft. high; at Great Livermere, 12 years planted, it is 18 ft. high. In Warwickshire, at Combe Abbey, 40 years planted, it is 14 ft. high, against a wall. In Yorkshire, at Hackress, 16 years planted, it is 8 ft. high; at Grimston, 13 years planted, it is 14 ft. high.

Laùrus nóbilis in Scotland. At Gosford House, 36 years planted, it is 15 ft. high, the diameter of the space covered by the branches 12 ft.; at Dalhousie Castle, 14 years planted, it is 15 ft. high, against a wall. In Berwickshire, at the Hirsel, 35 years planted, it is 14 ft. high, against a wall. In Haddingtonshire, at Tynningham, it is 10 ft. high. In Aberdeenshire, at Thainston, it grows 8 in. in a year, and stands the winter well in sheltered situations. In the Isle of Bute, at Mount Stewart, it is 27 ft. high, and the diameter of the space covered by the branches 26 ft. In Ross-shire, at Brahan Castle, it is 11 ft. high. In Stirlingshire, at Airthrey Castle, 45 years planted, it is 14 ft. high.

Laùrus nóbilis in Ireland. At Cypress Grove, Dublin, it is 50 ft. high, the diameter of the trunk 2 ft. 2 in., and of the head 25 ft. In the Cullen's Wood Nursery, 85 years planted, it is 25 ft. high, the diameter of the trunk 2¼ ft., and of the head 24 ft. In Wisklow, at Shelton Abbey, 16 years planted, it is 34 ft. high. In Fermanagh, at Florence Court, 30 years planted, it is 10 ft. high.

Laùrus nóbilis in Foreign Countries. In France, in the Botanic Garden, Toulon, 14 years planted, it is 19 ft. high, the diameter of the trunk 6 in.; at Vaucluse, among the scattered houses not far from the fountain, it was 15 ft. high, in 1819. Throughout Germany it is a green-house plant. In Russia, in the Crimea, it requires protection during winter. In Italy and Spain it attains a larger size than any where else in Europe, forming immense bushes, from 50 ft. to 70 ft. in height.

Commercial Statistics. Plants of the species in the London nurseries are 1*s.* each, and the varieties from 1*s.* 6*d.* to 2*s.* 6*d.*; at Bollwyller it is a greenhouse plant; at New York, plants are 1 dollar each.

B. *Plants evergreen; half-hardy.*

♀ 2. *L.* CAROLINE'NSIS *Catesb.* The Carolina Laurel, *or Red Bay.*

Identification. Catesb. Car., 1. p. 63.; Michx. Fl. Amer., 1. p. 245.; Pursh Fl. Amer. Sept., 1. p. 276.; Spreng. Syst., 2. p. 665.

Synonymes. *L.* Borbònia Lin. Sp., 529., Syst., 383., Martyn's Mill., No. 13., N. Du Ham., 2. p. 163., Lodd. Cat., ed. 1836; *L.* axillàris *Lam.*; Borbònia sp. *Plum. Gen.*, 4. ic. 60., *Pérsea* Borbònia Spreng.; the broad-leaved Carolina Bay; Laurier rouge, Laurier Bourbon, Laurier de Caroline, *Fr.*; Carolinischer Lorbeer, Rother Lorbeer, *Ger.*

Engravings. Catesb. Car., t. 63.; Michx. N. Amer. Syl., 2. t. 82.; N. Du Ham., 2. t. 33.; and our *fig.* 1168. after Michaux, and *fig.* 1169. after Du Hamel.

Spec. Char., &c. Evergreen. Leaves oval, lanceolate, slightly glaucous beneath. Flowers in peduncled axillary groups. (*Spreng. Syst.*, ii. p. 265.) An evergreen tree, a native of North America, from Virginia to Louisiana; introduced in 1739, and flowering in May; but seldom found in collections.

Varieties.

♀ L. *c.* 2 *glàbra* Pursh has the leaves slightly glabrous.

♀ L. *c.* 3 *pubéscens* Pursh has the leaves slightly pubescent.

♀ L. *c.* 4 *obtùsa* Pursh has the leaves ovate-obtuse.

All these varieties were introduced in 1806; and they all flower from May to July. In our *Hortus Britannicus*, and other modern catalogues, *L.* Borbònia and *L.* carolinénsis are made distinct species; the former being said to be tender, and introduced in 1739, and the latter to be hardy, and introduced in 1806. Both, however, are said to be the American red bay; and in Pursh's *Fl. Amer. Sept.*, and in the *N. Du Ham.*, they are considered identical. It appears probable that this is the case; and, as it appears from Michaux (*N. Amer. Sylva*, ii. p. 150.), that the tree differs exceedingly according to the latitude in which it grows, *L.* Borbònia (*fig.* 1168.) may be the form it assumes in the southern states, and *L.* carolinénsis (*fig.* 1169.) its appearance in the more northern ones.

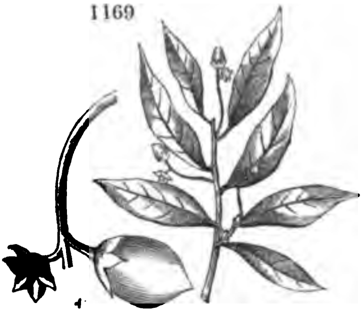


1168

Description, &c. The red bay, though it sometimes, in the south of Georgia and the Floridas, attains the height of 60 ft. or 70 ft., with a trunk from 15 in.

to 20 in. in diameter, yet rarely exhibits a regular form: its trunk is generally crooked, and divided into several thick limbs at 8 ft., 10 ft., or 12 ft. from the ground. In America, Michaux tells us, "upon old trunks the bark is thick, and deeply furrowed; that of the young branches, on the contrary, is smooth, and of a beautiful green colour. The leaves are about 6 in. long, alternate, oval-acuminate, glaucous on the lower surface, and evergreen. When bruised they diffuse a strong odour, resembling that of the sweet bay (*Laúrus nóbilis*),

1169



and may, like those of that species, be employed in cookery." (*Michx. North Amer. Syl.*, ii. p. 151.) The male flowers come out in long bunches from the axils of the leaves; and the female flowers in loose bunches on pretty long red peduncles. The berries are of a dark rich blue, in red cups, and they grow two, and sometimes three, together. The red bay is found in the lower part of Virginia, and it continues in abundance throughout the maritime districts of the Carolinas, Georgia, the two Floridas, and Lower Louisiana. Mixed with the sweet bay (*Laúrus nóbilis*), tupelo (*Nýssa biflòra*), red maple (*A'cer rùbrum*), and water oak (*Quércus aquática*), it fills the broad swamps which intersect the pine barrens. A cool and humid soil appears essential to its growth; and it is remarked, that the farther south it grows, the more vigorous and beautiful is its vegetation. It was discovered by Catesby, and described and figured by him in his work on Carolina; Miller cultivated it in 1739. In France, Plumier constituted it a genus, to which he gave the name of *Borbònia* in honour of Gaston de Bourbon, son of Henry IV., and uncle of Louis XIV. In America, the wood of the red bay is used for cabinet-making, as it is very strong, and of a beautiful rose-colour, has a fine compact grain, and is susceptible of a brilliant polish, having the appearance, as Catesby tells us, of watered satin. Before mahogany became the reigning fashion in cabinet-making, Michaux observes, the wood of the red bay was commonly employed in the southern states of North America by the cabinet-makers, who produced from it articles of furniture of the highest degree of beauty; but trees of the red bay are now no longer to be found in North America of sufficient diameter for this purpose, and recourse is had to mahogany, which is imported from St. Domingo at a moderate price. It might also be employed in ship-building, and for other purposes of construction, as it unites the properties of strength and durability; but its trunks are rarely found of sufficient dimensions to render it available for these purposes. In England it is solely considered as an ornamental tree; and as it is more tender than the common sweet bay, it is only suitable for warm or sheltered situations, or for being placed against a wall.

♣ 3. *L.* CATESBIA'NA Michx. Catesby's Laurel, *or Red Bay.*

Identification. Michx. Fl. Bor. Amer., 1. p. 244.: Spreng. Syst., 2. p. 265.; Pursh Fl. Amer., Sept. 1., p. 275.
Engraving. Catesb. Car., t. 28.

Spec. Char., &c. Evergreen. Leaves ovate-lanceolate, glossy. Flowers in a terminal panicle. Fruit ovate. (*Spreng. Syst.*, 2. p. 265.) An evergreen shrub, a native of the sea-coast of Georgia and Carolina, introduced in 1820, and flowering in May. The flowers are white, and the berries black, based by red calyxes, on thick red peduncles. We have not seen the plant.

♣ 4. *L.* AGGREGA'TA *Sims.* The grouped-*flowered* Laurel, *or Bay.*

Identification. Sims Bot. Mag., t. 2497.
Engravings. Bot. Mag., t. 2497.; and our *fig.* 1170.

Spec. Char., &c. Evergreen. Leaves ovate-acuminate, 3-nerved, glaucous beneath. Flowers upon distinct pedicels, disposed in axillary groups, that are attended at the base with scaly, ovate, concave bracteas. (*Sims* in *Bot. Mag.*, t. 2497.) An evergreen shrub, a native of China,

introduced in 1821. The leaves are alternate, petiolated, of a yellowish or apple green on the upper side, and very glaucous on the under, with the three nerves uniting a little above the insertion of the petiole, and terminating short of the point of the leaf. The young shoots are axillary, and come out from among the flowers, and are furnished with several membranaceous slightly coloured scales, or a sort of stipules, which are very deciduous. It is rather tender; but, from the locality, where it is indigenous, it would probably succeed with very little protection against a conservative wall.



1170

L. *fœ'tens* Ait., *L.* madeirénsis *Lam.*, Pérsea fœ'tens *Spreng.*, is a native of Madeira, and the Canary Islands, introduced in 1760, and producing its greenish yellow flowers from March to October. In its native country it forms a small tree 20 ft. high; but in British gardens it is commonly kept in a green-house, or in a cold-pit. The plant, however, in the Horticultural Society's Garden, has stood out as a bush since 1831, and is now upwards of 4 ft. high. There can be little doubt that this, and the other species enumerated as half-hardy, would stand against a wall with very little protection.

L. M*ýrrha* *Lour.* is a native of China, which has stood against a wall in the Horticultural Society's Garden since 1832. It is generally injured more or less when the winters are severe; but it always springs up again, and grows vigorously during summer.

L. *indica* L. is an evergreen tree, with noble foliage, which lives and attains a considerable size in our conservatories and green-houses; and there can be little doubt that in the south of England it would live against a conservative wall, at least as well as the orange and the lemon.

C. *Leaves deciduous.*

♀ 5. *L. SA'SSAFRAS* L. The Sassafras Laurel, *or Sassafras Tree.*

Identification. Lin. Hort. Cliff., 154., Gron. Virg., 46.; Kalm It., 2. p. 270. 434.; Mill. Dict., No. 7.; Trew Ehret, t. 59, 60.; Willd. Sp. Pl., 2. p. 485.; Lodd. Cat., ed. 1836.

Synonymes. Córnus más odoràta, folio trifido, margine plano, Sassafras dicta, *Pluk. Alm.*, 120, t. 222 f. 6., *Catesb. Car.*, 1. p. 55. t. 55., *Seligm. Av. Ic.*, 2. t. 10.; Sassafras arbor, ex Florida, ficulneo folio, *Bauh. Pin.*, 431.; *Sássafras* sp. *C. G. Nees Von Esenbeck*; *Pérsea Sássafras* Spreng.; Laurier Sassafras, *Fr.*; Sassafras Lorbeer, *Ger.*

Engravings. Trew Ehret, t. 59, 60.; Blackw. Herb., t. 267.; Giesecke Ic., fasc. 1. No. 9.; Pluk. Alm., t. 222. f. 6.; Catesb Car., 1. t. 55.; Seligm. Av. Ic., 2. t. 10.; and plates in our last Volume.

Spec. Char., &c. Sexes diœcious. Habit arborescent. Both leaves and flowers are produced from the same buds. Buds, younger branches, and the under surface of the leaves, pubescent. Leaves entire, or with 2—3 lobes. Veins prominent on the under side. Flowers in corymbose conglomerate racemes. Anthers with 4 unequal cells. In the female flower, additionally to the pistil, are 6 gland-like bodies, like those in the male flowers. (*Nutt. Gen.*, i. p. 259.) A deciduous tree, from 40 ft. to 50 ft. high. A native of North America. Introduced in 1633, and flowering in April and May.

Varieties. Nuttall states (*Gen. & Cat. N. A. P.*) that the inhabitants of North and South Carolina distinguished two kinds of sassafras, the red and the white, calling the latter, also, the smooth. The red he identifies with the *L.*, subgenus Euósmus *Nutt.*, *Sássafras* L.; and the white or smooth he considers a species belonging to the same subgenus, which he calls *L.* E. álbida *Nutt.*, and of which he has adduced the following characteristics. Its buds and younger branches are smooth and glaucous; its leaves are every where glabrous and thin, and the veins are obsolete on the under surface; the petiole is longer. He had not seen it in flower. The root is much more strongly camphorated than the root of the red sort (*L. Sássafras*), and is nearly white. This kind is better calculated to answer as a substitute for ochra (*H*ibíscus esculéntus) than the *L. Sássafras*, from its buds and young branches being much more mucilaginous. It is abundant in North and South Carolina, from the Catawba Mountains to the east bank of the Santee, growing with *L. Sássafras*, which, in North Carolina, is less abundant. (*Nut. Gen.*, i. p. 259, 260.)

Description, &c. The sassafras tree often grows, even in England, to the height of 40 ft. or 50 ft. (See plate of the tree at Syon, in our last Volume.) The leaves, which vary very much in size and shape, are covered, when they first appear, with a soft woolly down; they are generally deeply lobed, on long footstalks, and of a pale green; they fall off early in autumn. The flowers are of a greenish yellow, and but slightly odoriferous; the berries are oval, of a bright but deep blue, and contained in small dark red cups,

supported by long red peduncles. These berries are greedily devoured by birds, and consequently do not remain long on the tree. The bark of the young branches is smooth, and beautifully green; but, when old, it becomes of "a greyish colour, and is chapped into deep cracks. On cutting into it, it exhibits a dark dull red, a good deal resembling the colour of Peruvian bark." (*Michx. N. Amer. Syl.*, ii. p. 146.) In the United States the sassafras is found as far north as lat. 43°; but it there appears only as a tall shrub, rarely exceeding 15 ft. or 20 ft. in height. In the neighbourhood of New York and Philadelphia, however, it grows to the height of 40 ft. or 50 ft., and attains a still greater size in the southern states. It is abundant from "Boston to the banks of the Mississippi, and from the shores of the ocean in Virginia to the remotest wilds of Upper Louisiana beyond the Missouri, comprising an extent in each direction of more than 1800 miles." (*Michx.*) "The sassafras, on account of its medicinal properties, was one of the first American trees which became known to Europeans. Monardez, in 1549, and after him Clusius," treat of its uses. Gerard calls it the ague tree, and says, that a decoction of its bark will cure agues, and many other diseases. The bark is still employed in medicine, that of the roots being preferred; and it is said to be an excellent sudorific. A decoction of the chips is well known as a remedy for scorbutic affections. In different parts of the United States, a tea is made of the flowers, which is considered very efficacious in purifying the blood. In Louisiana the leaves are used to thicken pottage; and in Virginia a beer is made of the young shoots. The sassafras chips which are sold in the English druggists' shops are formed of the wood of this tree; but what are called the sassafras nuts are the fruit of the Laúrus Pùcheri of the *Flora Peruviana.* (See *Lindl. Nat. Syst. of Bot.*) Bigelow says that this tree is produced in almost every part of the United States. "It not only inhabits every latitude from New England to Florida, but we are told it is also found in the forests of Mexico, and even in those of Brazil. Its peculiar foliage, and the spicy qualities of its bark, render it a prominent object of notice, and it seems to have been one of the earliest trees of the North American continent to attract the attention of Europeans. Its character, as an article of medicine, was at one time so high, that it commanded an extravagant price, and treatises were written to celebrate its virtues. It still retains a place in the best European pharmacopæias." (*Bigelow's American Botany*, vol. ii. p. 141.) He adds that "the bark has an agreeable smell, and a fragrant spicy taste. The flavour of the root is more powerful than that of the branches; and both flavour and odour reside in a volatile oil, which is readily obtained from the bark by distillation. The bark and pith of the young twigs abound with a pure and delicate mucilage; and in this mucilage and the volatile oil all the medicinal virtues of the tree are contained. The bark and wood were formerly much celebrated in the cure of various complaints, particularly in rheumatism and dropsy; but they are now only recognised as forming a warm stimulant and diaphoretic." (*Ibid.*) The sassafras is of little value as a timber tree. In America, the wood, which is white or reddish, is sometimes used for making bedsteads and other articles of furniture, which are not liable to be attacked by insects, and have a most agreeable odour, which they retain as long as they are sheltered from the sun and rain. The wood is of very little esteem for fuel; and the "bark contains a great deal of air, and snaps while burning like that of the chestnut." (*Michx.*) The most interesting historical recollection connected with this tree is, that it may be said to have led to the discovery of America; as it was its strong fragrance, smelt by Columbus, that encouraged him to persevere when his crew mutinied, and enabled him to convince them that land was near at hand.

Soil, Propagation, &c. Any free soil, rather moist than dry, will suit this species, which is generally propagated from imported seeds, which should be sown or put in a rot-heap, as soon as received, as they remain a year, and sometimes two or three years, in the ground, before they come up. The sassafras may also be propagated by cuttings of the roots, or by suckers, which

the roots of old trees (at Syon, for example,) throw up in great abundance. The situation where the tree is finally planted should be sheltered; and, in the north of England and in Scotland, to insure fine foliage, it should be planted against a wall.

Statistics. *Laúrus Sássafras in England.* In the environs of London, the largest tree is at Syon, where it is 40 ft. high, the diameter of the trunk 1 ft. 8 in., and of the head 29 ft. At Kew, it is 40 ft. high. In the Fulham Nursery, it is 30 ft. high. In the Mile End Nursery, it is 21 ft. high. South of London, in the Isle of Jersey, in Saunders's Nursery, 14 years planted, it is 12 ft. high, the diameter of the trunk 9 in., and of the head 9 ft. In Kent, at Cobham Hall, 30 years planted, it is 50 ft. high, and the diameter of the trunk 1 ft. 6 in. In Surrey, at St. Ann's Hill, 30 years planted, it is 22 ft. high, the diameter of the trunk 1 ft. 2 in., and of the head 12 ft. North of London, in Worcestershire, at Croome, 40 years planted, it is 25 ft. high, the diameter of the trunk 9 in., and of the head 12 ft.

L. Sássafras in Scotland. In the Isle of Bute, at Mount Stewart, it is 10 ft. high, the diameter of the trunk 3 in., and of the head 5 ft.

L. Sássafras in Ireland. In the environs of Dublin, at Castletown, it is 28 ft. high, the diameter of the trunk 1 ft. 6 in. North of Dublin, in Galway, at Coole, it is 19 ft. high, the diameter of the trunk 12 in., and of the head 22 ft. In Louth, at Oriel Temple, 12 years planted, it is 9 ft. high, the diameter of head 5 ft.

L. Sássafras in Foreign Countries. In France, at Sceaux, 10 years planted, it is 15 ft. high, the diameter of the trunk 8 in., and of the head 6 ft. In the neighbourhood of Nantes, 24 years planted, it is 30 ft. high, with a trunk 2 ft. in diameter. In the Botanical Garden at Avranches, 29 years planted, it is 20 ft. high, the diameter of the trunk 8 in., and of the head 12 ft. In Italy, in Lombardy, at Monza, 12 years planted, it is 10 ft. high, the diameter of the trunk 8 in., and of the head 5 ft.

Commercial Statistics. Plants in the London nurseries, are 5*s.* each; and seeds 6*s.* a quart; at Bollwyller, plants are 2 francs and 30 cents each; and at New York, 25 cents.

6. *L. Benzo'in* L. The Benzoin Laurel, *or Benjamin Tree.*

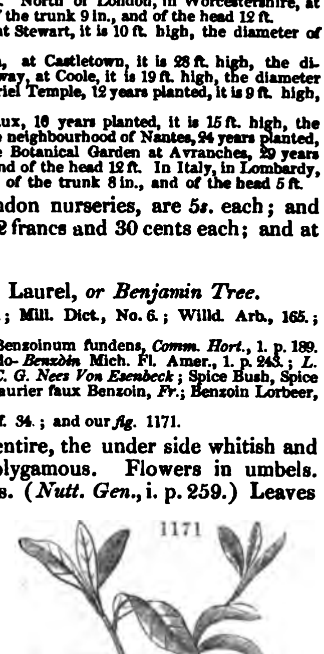
Identification. Lin. Hort. Cliff., 154.; Gron. Virg., 46.; Mill. Dict., No. 6.; Willd. Arb., 165.; Willd. Sp. Pl., 2. p. 485.; Lodd. Cat., ed. 1836.

Synonymes. Arbor virginiana citreæ vel limonii folio, Benzoinum fundens, *Comm. Hort.*, 1. p. 189. t. 97.; *Laúrus æstivàlis Wangh. Amer.*, 87.; *L.* Pseùdo-*Benzòin* Mich. Fl. Amer., 1. p. 243.; *L.* Euósmus *Benzòin* Nutt. Gen., 1. p. 259.; *Benzòin*, sp. *C. G. Nees Von Esenbeck*; Spice Bush, Spice Wood, or wild Allspice, *Amer.*, according to Nuttall; Laurier faux Benzoin, *Fr.*; Benzoin Lorbeer, *Ger.*

Engravings. Comm. Hort., 1. t. 97.; Pluk. Alm., t. 139. f. 34.; and our *fig.* 1171.

Spec. Char., &c. Leaves cuneate-obovate, entire, the under side whitish and partly pubescent, deciduous. Sexes polygamous. Flowers in umbels. Buds and pedicels of the umbels glabrous. (*Nutt. Gen.*, i. p. 259.) Leaves without nerves, ovate, acute at both ends. (*Willd. Sp. Pl.*, ii. p. 485.) A deciduous shrub, a native of Virginia, where it grows to the height of 10 ft. or 12 ft. It was introduced in 1688, and is not unfrequent in collections. In British gardens, it forms a rather tender peat-earth shrub, handsome from its large leaves, but seldom thriving, except where the soil is kept moist and the situation sheltered. The bark of *L. Benzòin* is highly aromatic, stimulant, and tonic, and is extensively used in North America in intermittent fevers. The oil of the fruit is said to be stimulant. (*Lindl. Nat. Syst. of Bot.*, on the information of Barton.) The true Benjamin tree, or gum benzoin, is not, as Ray supposed, this *Laúrus Benzòin*, but a species of Stýrax; as was first shown by the late Mr. Dryander, in the *Philosophical Transactions* for 1787, p. 307, t. 12. (*Rees's Cyclop.*) Laúrus *Benzòin* is propagated from imported seeds, which require to be treated like those of *Laurus Sássafras.*

1171



Statistics. The largest plant, in the neighbourhood of London, is at Ham House, where it is 15 ft. high; at Syon, it is 14 ft. high; at Kew, 6 ft high; in the Horticultural Society's Garden, 8 ft. high. In Sussex, at Westdean, 14 years planted, it is 12 ft. high. In Warwickshire, at Newnham Paddocks, 10 years planted, it is 5 ft. high. In Worcestershire, at Croome, 15 years planted, it is 15 ft. high; at Hagley, 12 years planted, it is 6 ft. high. In Ireland, at Oriel Temple, 12 years planted, it is 6 ft. high. In Germany, near Vienna, at Brück on the Leytha, 25 years planted, it is 15 ft. high. At Berlin, in the Botanic Garden, 14 years planted, it is 10 ft. high. In Italy, at Monza, 24 years planted, it is 14 ft. high.

Commercial Statistics. Price of plants, in the London nurseries, 1*s.* 6*d.* each, and seeds 6*s.* a quart; at Bollwyller, 2 francs; and at New York, 25 cents.

■ 7. *L.* (*B.*) *Diospy'rus* *Pers.* The Diospyrus-*like* Laurel, *or Bay.*

Identification. Pers. Syn., 1. p. 450.; Bot. Mag., t. 1470.; where Dr. Sims states that Persoon's epithet, *Diospy̆rus*, is an abbreviation of Michaux's one of *diospyrōides.*
Synonymes. *L.* Eubsinus *Diospy̆rus Nutt. Gen.*, 1. p. 259.; *L. diospyrōides Michx. Fl. Bor. Amer.*, 1. p. 243.; ? *L.* melissæfòlia *Walt. Fl. Car.*, 134. Dr. Sims (*Bot. Mag.*, t. 1470.) states that he has not much doubt that the *L.* melissæfòlia *Walter* is identical with this species; and he adds that Mr. Fraser, who was the friend of Walter, and editor of his work, always considered it as such, and has remarked that "the leaves are not at all like those of the balm; but it was, probably, the scent, not the form, that suggested the appellation."
Engravings. Bot. Mag., t. 1470.; and our *fig.* 1172.

Spec. Char., &c. Habit low, surculose, twiggy. Leaves oblong-oval and entire, the under side veiny and pubescent, deciduous. Flower buds and pedicels villous. Sexes diœcious. Fruit large. (*Nutt. Gen.*, i. p. 259.) A running twiggy shrub, 2 ft. or 3 ft. high, in its native swamps, in Virginia and Carolina; introduced in 1810. Leaves opaque, oblong-oval, attenuated towards the base, entire, the under side veiny and pubescent, deciduous. Scales of the buds purple, villous. Younger branches villous. Sexes diœcious. Flower buds and pedicels villous. Flowers disposed in sessile umbeled groups, 3—5 in a group. Perfect stamens 9. Gland-like bodies large, orange yellow. Fruit larger than that of *L. Benzòin*, oblong-ovate, scarlet, upon thick and distinct pedicels Cotyledons large, thick, oily, attached by near their base to the remainder of the embryo. (*Nutt. Gen.*, i. p. 259.) It is what may be deemed the male sex that is represented in *Bot. Mag.*, t. 1470., and our *fig.* 1172.; and in the text of the *Bot. Mag.* is the following interesting information by Dr. Sims, on the structure of its flowers. There were 9 perfect stamens, and an imperfect ovary; and 6 glands on short pedicels, resembling so many little yellow mushrooms, with a warty pileus: the anthers had 2 cells each. (*Bot. Mag.*) *L.* Pseùdo-*Benzòin* Michx. is supposed by Dr. Sims (*Bot. Mag.*, t. 1471.) to be either identical with, or a slight variation from, this species. The only plant which we have seen bearing the name of *L. Diospy̆rus* is at White Knights, where it so closely resembles *L. Benzòin*, as to leave no doubt in our mind that Dr. Sims's conjecture was right.



1172

■ 8. *L.* (*B.*) *æstiva'lis* *L.* The summer Laurel, *or Willow-leaved Bay.*

Identification. Lin. Sp., 529.; Syst., 384.; Mart. Mill., No. 24.; Willd. Sp. Pl., 2. p. 485.
Synonymes. *L.* enérvia *Mill. Dict.*, No. 8.; L. Euósmus æstivàlis *Nutt. Gen.*, 1. p. 259.; Pond bush, *Amer.*; Sommer Lorbeer, *Ger.*
Engraving. Catesb. Car., 2. t. 28.

Spec. Char., &c. Leaves oblong-acuminate, entire, glabrous, veiny, deciduous. Flowers in umbels. Sexes polygamous. (*Nutt. Gen.*, i. p. 259.) Dr. Sims has noted, incidentally, in the *Bot. Mag.*, t. 1470., that there are two different specimens of the *L.* æstivàlis in the Banksian herbarium; that one of them, the flowering specimen from Jacquin's herbarium, is evidently a specimen of the *L.* geniculàta *Bot. Mag.*, t. 1471.; and that the other, in the leaves, is similar to the *L. Diospy̆rus Bot. Mag.*, t. 1470. Farther, Dr. Sims has noted, t. 1471., that it is not easy to say to which species *L.* æstivàlis really belongs, and that if Linnæus had meant the character of supra-axillary branches to describe that the buds are produced below the branches, and not in the axils of them, it is as applicable to the allied *L. Diospy̆rus* and *L.* geniculàta. (*Bot. Mag.*, t. 1470.) A shrub, about 6 ft. or 8 ft. high, a native of Virginia, in the swamps which intersect the pine barrens. Introduced in 1775. There was a plant in the Horticultural Society's Garden, some years ago, which is since dead.

■ 9. *L.* GENICULA'TA *Michx.* The knee-flexed-*branched* Laurel, *or Bay.*

Identification. Michx. Fl. Bor. Amer., 1. p. 244.; Pers. Synops., 1. p. 450.; Walt. Fl. Car., p. 133.; Pursh Fl. Amer. Sept., 1. p. 276.; Bot. Mag., t. 1471.
Synonymes. *L.* Euósmus geniculàta *Nutt. Gen.*, 1. p. 259.; *L.* æstivalis *Willd. Sp. Pl.*, 2. p. 484., according to Pursh.
Engravings. Bot. Mag., t. 1471.; and our *fig.* 1173.

Spec. Char., &c. Branches divaricate and flexuous. Leaves cuneate-oblong, mostly obtuse, about 1½ in. long, in many instances less than half an inch wide, entire, glabrous, except upon the under side near the base. Flowers in terminal small umbels, that are upon conspicuous footstalks and smooth. Anthers unequally 4-celled. Sexes polygamous. (*Nutt. Gen.*, i. p. 259.) Nuttall adds that this kind grows from 8 ft. to 12 ft. high, and that the branches are flexuous, grey, smooth, and so remarkably divaricated as to give a characteristic appearance to the pods which they border; and that its native localities are, invariably, sandy swamps, and the margins of lagoons, from Virginia to Florida. Dr. Sims has noted that the zigzag direction and deep colour of the branches distinguish the *L.* geniculàta at first sight; and that he could not perceive in its bark any of the aromatic scent so remarkable in most of the genus, and which is so clearly perceptible in *L. Benzòin.* Pursh states that the flowers are yellow, and the berries globose and scarlet. We received a plant of this species from Bartram's Botanic Garden, in 1831: it appeared very distinct; but, owing to the crowded state of our garden, and the want of moisture, it died in the summer of 1834. Price of plants, at New York, 1 dollar.



1173

App. I. *Half-hardy Species of* Lauràceæ.

Cinnamòmum Cámphora Swt. *Laúrus Cámphora* L., the Camphor tree, (*N. Du Ham*, 2. t. 35.; *Bot. Mag.*, t. 2658.; and our *fig.* 1174.) is a native of Japan, and other parts of Eastern India, where it grows to the height of the European lime tree. and makes a fine appearance, from its glossy shining leaves. The wood is white, with reddish waxy leaves, and the odour of camphor is exhaled from it, and from every other part of the plant. Camphor, and camphor oil, are well known medicines, which are obtained from this tree. Camphor is considered one of the principal diaphoretics, and is of a particularly subtile and penetrating



1174



1175

nature, quickly diffusing itself through the whole human frame. It is used in a great variety of medical preparations. Camphor is obtained from the tree by splitting the wood into small pieces, and distilling it with water in an iron retort, covered with an earthen or wooden pot, in the hollow of which hay or straw is placed, to which the camphor adheres as it rises with the steam of the water. It is at first of a brownish white, and in very small particles, but, after being redistilled, it is compressed into the lumps which we see in the shops. The camphor used in Europe is chiefly imported from Japan. Camphor oil is obtained by making an incision in the trunk of the tree, and inserting a small tube of reed, through which the sap exudes, from which the oil is obtained by skimming. In British gardens the camphor tree is commonly kept in green-houses or cold-pits; and we have no doubt whatever, that, with a moderate degree of protection, it would live against a conservative wall.

C. *vèrum* Swt.; *Laúrus* Cinnamòmum *L.*; *L.* Cássia *Bot. Mag.*, 1636.; and our *fig.* 1175.; the

cinnamon tree, is a native of the Island of Ceylon, and other parts of the East; and it has been introduced into South America, and the Isle of France, where it is cultivated for the bark. It is commonly considered as a stove plant, but it has ripened seeds in the conservatory of M. Boursault, at Paris, from which young plants have been raised, in 1827, 1828, and 1829, and these plants have stood the winter in the open air there for several years, with very little protection. It well deserves a trial, therefore, against a conservative wall, in British gardens.

C. *Cássia* D. Don; *Laúrus Cássia L.*; *L. Cinnamómum Bot. Rep.*; *Pérsea Cássia Spr.*; the Wild Cinnamon, *Bot. Rep.*, t. 596., which is a native of Ceylon, where it grows to the height of 50 ft. or 60 ft., with large spreading branches, is thought to be nothing more than C. vèrum in a wild state.

Other ligneous plants belonging to this order, natives of Japan, Mexico, the Cape of Good Hope, and of New South Wales, and usually kept in green-houses, will be found enumerated in our *Hortus Britannicus*. Most of them, we have no doubt, could make a much better appearance against a flued conservative wall, than ever they can do in a house.

CHAP. XCIV.

OF THE HALF-HARDY LIGNEOUS PLANTS BELONGING TO THE ORDER PROTEA'CEÆ.

All the plants of this order are ligneous; and, with very few exceptions, are natives of Australia, and the Cape of Good Hope. Many species have been introduced, belonging to upwards of 30

1176





1177



1178

genera; and, doubtless, there are a great number of these, particularly the natives of New Holland, which would stand the winters of the climate of London against a conservative wall.

Bánksia littorális R. Br. is a native of New Holland, where it forms a bush 8 ft. high. A plant stood against a wall in the Horticultural Society's Garden, from 1832 till it was killed by the severe spring of 1836.

B. oblongifòlia Cav., Bot. Cab., 241., stood out with us at Bayswater for four years, but was killed in the spring of 1836.

Grevíllea rosmarinifòlia Cun. (*fig.* 1176.) is a very elegant plant, a native of New South Wales, where it grows to the height of 4 ft. or 5 ft. A plant has stood out in front of the stove at Kew, since 1826, flowering freely every year.

G. acuminàta R. Br. (*figs.* 1177, 1178.) is also a native of New South Wales, and is considered equally hardy with G. rosmarinifòlia.

Hàkea aciculàris R. Br., Vent. Malm., 3.; *H. suavèolens* R. Br.; and *H. pugionifórmis* R. Br., Bot. Cab., 353., and our *fig.* 1179.; have stood out in the Horticultural Society's Garden since 1832.



1179

It is probable that most of the species belonging to this order are equally hardy with those above enumerated; and we should have no hesitation in asserting that, against a flued wall, with straw hurdles to be set against it during severe weather, and taken off for an hour or more every fine day, all the Proteàceæ might be exhibited in the climate of London in greater vigour and beauty than they are in their native country. This may be thought a bold assertion; but, as it holds good in the case of *E*rica and Pelargònium, we see no reason why, if the same care were applied, the same should not follow in the case of all the plants of this very interesting order.

CHAP. XCV.

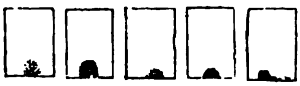
OF THE HARDY LIGNEOUS PLANTS OF THE ORDER *THYMELA'CEÆ*.

These belong to two genera, *Dáphne L.* and Dírca *L.*, which have the following characters: —

Da'phne *L.* Calyx inferior, somewhat salver-shaped; in most, of some other colour than that of the leaves, and, from its shape and colour, resembling a corolla: segments of its limb 4, deep, ovate, or oblong, imbricate in æstivation. Stamens 8, in two rows; the filaments with but a short part distinct from the tube of the calyx; the anthers not prominent beyond it. Ovary solitary. Ovule solitary, pendulous. Style very short. Stigma capitate. Fruit an ovate carpel, pulpy externally. Seed 1, pendulous. Shrubs. Inner bark silky. Most of the kinds evergreen. Leaves entire, in most alternate; if not alternate, opposite. Flowers terminal or axillary, mostly in groups, highly fragrant. The whole plant, in most, perhaps in all, intensely acrid and dangerous. (*Smith Eng. Flora*; *Lindl. Nat. Syst.*; *Brown Prod.*, and observation.)

Di'rca *L.* Calyx inferior, funnel-shaped, ending in 4 (Du Hamel has stated in the "essential character" 5) unequal teeth: it is of a pale yellow colour, and hence, and from its figure, resembles a corolla. Stamens 8, arising from the middle of the calyx, and prominent beyond its tip, unequal. Ovary solitary. Style thread-shaped, extending a little beyond the stamens. Stigma a simple point. Fruit a dry carpel. Seed 1, pendulous. D. palústris *L.* is the only species described; and is a low shrub, that has upright branches, a very tough bark, and flowers 3 together. (*Du Ham.*, *Bot. Reg.*, *Lindl. N. S.*, and observation.)

Genus I.



DA'PHNE L. The Daphne. *Lin. Syst.* Octándria Monogýnia.

Identification. Lin. Gen., 192.; Juss. Gen. Pl., 77.; Lam. Ill., t. 290.; Smith Eng. Flora, 2. p. 228.
Synonyme. Thymelæ'a *Tourn. Inst.*, t. 366., *Gærtn.*, t. 39.
Derivation. *Daphnē* is asserted by Lindley, and some other botanists, to have been the Greek name of the *Rúscus* racemòsus, or Alexandrian laurel, into which it is fabled that Daphne was changed. "Why the name has been applied to the shrubs now called *Dáphne*, it is not easy to say." (*Lindl. Bot. Reg.*, t. 1177.) It is stated in Rees's *Cyclopædia*, under *Laúrus*, that *L.* nóbilis "is certainly the *Daphnē* of Dioscorides, and, consequently, the classical laurel. It is still called by the same name among the modern Greeks;" this is also the popular belief (See St. Pierre's *E'tudes de la Nature*, Lempriere's *Class. Dict.*, &c. &c.) Supposing the *Daphnē* to have been the *Laúrus* nóbilis, or bay tree, it is easy to account for its being applied to this genus, the *D. Mezèreum* being formerly called the dwarf bay in England; and nearly all the species retaining the names of laureole and laureola in France and Italy.

Description, &c. Undershrubs, evergreen and deciduous, natives chiefly of Europe, but partly also of the cooler parts of Asia, including Japan and China. The odour of some of the species is very agreeable; and the bark of all of them is acrid. They are all beautiful, and rather difficult to propagate, except by seeds. The price of plants, in the London nurseries, is from 1*s.* to 2*s.* 6*d.* for all the sorts, except *D. Mezèreum*, and *D.* Lauréola, which are 6*d.* each.

A. *Leaves deciduous.*

● 1. *D. Meze'reum* L. The Mezereon Daphne, *or common Mezereon.*

Identification. Lin. Sp. Pl., p. 509.; Willd. Sp. Pl., 2. p. 415.; Mill. Dict., n. 2.; Smith Eng. Flora, 2. p. 228.; Lodd. Cat., ed. 1836.
Synonymes. Spurge Olive, Spurge Flax; Flowering Spurge, *Parkinson*; Dwarf Bay, *Gerard*; Laureole femelle, Bois gentil, Mézèreon, Bois joli, *Fr.*; gemeiner Seidelbast, or Kellerhalz, *Ger.*; Peperachtige Daphne, *Dutch*; Laureola femina, Biondella, Camelia, *Ital.*; Laureola hembra, *Span.*
Derivation. Mezereum and Mezereon are said to be derived from *madzaryon*, the Persian name for this shrub.
Engravings. Eng. Bot., t. 1381.; Œd. Fl. Dan., t. 268.; and our *fig.* 1180.

Spec. Char., &c. Leaves lanceolate, deciduous. Flowers distributed over the branches in threes mostly, and in pairs and fours, expanded before the leaves are protruded. A native of the woods of northern Europe. (*Willd.*, *Smith*, and obs.) Found in woods, but rare, in the south and west of

England; growing to the height of 4 ft., and flowering in February, March, or April.

Varieties.

■ D. M. 2 *flòre álbo* has white flowers and yellow fruit.

■ D. M. 3 *autumnàle.* — This is a remarkably distinct variety, not fastigiate in its mode of growth, but spreading; also with larger leaves than the species, and producing its flowers in autumn. These are very seldom succeeded by fruit, as might be expected from the season at which they are produced. It is a most desirable shrub, being commonly covered with its gay pinkish blossoms from November to March. It is rare in the nurseries about London; and is principally propagated by the Messrs. Backhouse of York.

Description, &c. The mezereon is a well-known shrub, much valued in our gardens and shrubberies for the beauty both of its flowers and fruit. It produces its agreeably fragrant flowers in February or March, before the leaves; when, as Cowper has beautifully expressed it, its branches are

> "Though leafless, well attired, and thick beset
> With blushing wreaths, investing every spray." *Task*, book v.



1180

The whole shrub is poisonous to human beings, though the berries are a favourite food for finches, and other birds, more especially the robin. The bark is powerfully acrid: it is used in France for forming setons or slight blisters, and is very efficacious in cases where it is thought desirable to produce a slight serous discharge, without raising a large blister. When either the bark or berries are chewed, they produce violent and long-continued heat and irritation in the mouth and throat. The mezereon is sometimes used in medicine; but it requires to be administered by a skilful hand. When the berries have been eaten by children or others, accidentally, the best remedies are oil, fresh butter, linseed tea, milk, or some other kind of emollient, to allay the violence of the inflammation. The branches of this plant afford a yellow dye. The mezereon is of very easy culture. It is generally propagated by seeds; which, if suffered to get dry before they are sown, will remain two years in the soil; but which, if sown in autumn immediately after gathering them, generally come up the following spring. The best time for transplanting this shrub is in October, as it begins to vegetate very soon after Christmas. It thrives most in a loamy soil, and in an open situation; and, when it is properly treated, and has room, it will in 8 or 10 years form a bush 5 ft. or 6 ft. high, and 7 ft. or 8 ft. in diameter. There is a plant in the arboretum of Messrs. Loddiges, 6 ft. high. Price of plants, in the London nurseries, 50*s.* a hundred; and of the autumn-flowering variety, 1*s.* 6*d.* a plant: at Bollwyller, 50 cents a plant: and at New York, 20 cents, and of the white-flowered variety, 50 cents.

■ 2. *D.* ALTA'ICA *Pall.* The Altaic Daphne.

Identification. Pall. Fl. Ross., 1. p. 53. t. 35.; Willd. Sp. Pl., 2. p. 422.; Sims in Bot. Mag., t. 1875.; Lodd. Cat., ed. 1836.
Synonymes. Daphné altaique, Laureole de Tartarie, *Fr.*; Sibirischer Seidelbast, *Ger.*
Engravings. Pall. Fl. Ross., 1. t. 35.; Bot. Mag., t. 1875.; Bot. Cab., t. 399.; and our *fig.* 1181.

Spec. Char., &c. Leaves obovate-lanceolate, glabrous. Flowers sessile, in terminal umbels, about 5 in an umbel. (*Sims* in *Bot. Mag.*, t. 1875.) Bark reddish brown in colour. Leaves oblong, broader towards the upper extremity, and narrowed downwards, of a somewhat glaucous and yellowish green, the latter colour prevailing most while they are young. Flowers white, and scentless; produced in May and June. Lobes of

the calyx revolute. A native of the Altaic Alps, in Siberia. (*Ibid.*) In the *Nouveau Du Hamel*, it is stated that this plant bears a striking resemblance, in its general appearance, to the mezereon, with the exception of the flowers, which are disposed in terminal umbels, and are white and scentless. It is at present not very common in British collections, though it well deserves a place there, from its neat compact habit of growth; and from its flowers, which come in in succession to those of the common mezereon. Plants, in the London nurseries, are 2*s*. 6*d*. each.


1181

3. *D.* ALPI'NA *L.* The Alpine Daphne.

Identification. Lin. Sp., 510., Syst., 371.; Willd. Sp. Pl., 2. p. 418.; Mill. Dict., n. 5.; Gouan Illustr., 27.; Willd. Arb., 99.; Lodd. Cat., ed. 1836.
Synonymes. The Alpine Chamelea *Marsh. Plant.*, 2. p. 112.; Daphné des Alpes *Fr.*; Alpen Siedelbast, *Ger.*
Engravings. Lodd. Bot. Cab., t. 66.; and our *fig.* 1182.


1182

Spec. Char., &c. Leaves lanceolate, a little obtuse, tomentose beneath, deciduous. Flowers sessile, aggregate. (*Willd. Sp. Pl.*, ii. p. 418., and observation.) A native of the Alps of Switzerland, Geneva, Italy, and Austria; where it grows to the height of 2 ft., flowering from May to July. It was introduced in 1759, and is frequent in collections.

Description, &c. A low branchy shrub, with white flowers, silky on the outside, which come out in clusters from the sides of the branches, and are very fragrant. They appear in March, and are succeeded by roundish red berries, that ripen in September. It is quite hardy, and is very suitable for rockwork; as the roots fix themselves deeply into the crevices of the rocks.

B. *Erect. Leaves persistent. Flowers lateral.*

4. *D.* LAURE'OLA *L.* The Laureola Daphne, *or Spurge Laurel.*

Identification. Lin. Sp. Pl., 510.; Willd. Sp. Pl., 2. p. 418.; Smith Eng. Flora, 2. p. 229.; Hook. Fl. Scot., 119.; Jacq. Austr., t. 183.; Lodd. Cat., ed. 1836.
Synonymes. Daphnöides vèrum, vel Laurèola, *Gesn.*, fasc. 1. 7. t. 6. f. 9.; Laurèola *Raii Syn.*, 465., *Ger. Em.*, 1404.; Thymelæ'a Laurèola, *Scop. Carn.*, 2. n. 463.; the Evergreen Daphne; Lauréole male, Lauréole des Anglais, *Fr.*; Immergrüner Seidelbast, *Ger.*
Engravings. Eng. Bot., t. 119.; Jacq. Austr., t. 183.; and our *fig.* 1183.

Spec. Char., &c. Evergreen. Leaves obovate-lanceolate, smooth. Flowers in axillary, simple, drooping clusters, that are shorter than the leaves: flowers in each about 5. Calyx obtuse. (*Smith Eng. Flora.*, ii. p. 229.) An evergreen shrub; a native of Britain, and most other parts of Europe, in woods; growing to the height of 3 ft. or 4 ft., and producing its yellowish green flowers, which are disposed in clusters of 5 each, soon after Christmas, if the weather be not very severe, and continuing flowering till March. Though not showy in its flowers, it is a valuable plant for a shrubbery, from its being evergreen, and from its thick, glossy, shining leaves being disposed in tufts at the ends of the branches, so as to give it a full bushy appearance; which has a good effect in plantations, where it is desirable to produce masses of dark green. It thrives best in the shade, and will flourish in situations under the drip of trees, where few other plants would grow.


1183

If exposed to the sun, the leaves turn back with a kind of twist; and, instead of their natural pure deep green, they assume a brownish tinge. The berries are oval, green at first, but black when ripe; and they are a favourite food of singing birds: though, as De Candolle observes in the *Flore Française*, they are poisonous to all other animals. The spurge laurel is propagated by seeds, like the mezereon; but, as they will remain two years in the ground before they vegetate, they are generally treated like haws, and kept for some time in the rotting-heap. It may also be propagated by cuttings; but not readily. It is much used in nurseries, as a stock on which to graft the more tender species of the genus; but as, like all the other daphnes, it has few roots, it requires to be transplanted with care.

■ 5. *D.* PO'NTICA *L.* The Pontic Daphne, *or twin-flowered Spurge Laurel.*

Identification. Lin. Sp. Pl., 511.; Pall. Fl. Ross., 1. p. 54.; Willd. Sp. Pl., 2. p. 419.; Lodd. Cat., ed. 1836.
Synonymes. Thymelæ'a póntica, citrei foliis, *Tourn. Itin.*, 3. p. 180. t. 180.; Lauréole du Levant, *Fr.*; Pontischer Siedelbast, *Ger.*
Engravings. Tourn. Itin., 3. t. 180.; Bot. Mag., t. 1282.; and our *fig.* 1184.

Spec. Char., &c. Evergreen. Leaves obovate-lanceolate, glabrous. Flowers bractless, glabrous, in many-flowered upright clusters, each of the long partial stalks of which bears two flowers. Lobes of the calyx lanceolate, long. (*Spreng.*) A native of Asia Minor, where it forms a shrub, growing to the height of 4 ft. or 5 ft., and producing its greenish yellow flowers in April and May. It was introduced in 1759, and is frequent in collections.

Varieties.

■ D. *p.* 2 *rùbra* Hort. has red flowers, and is supposed to be a hybrid. It is rather more tender than the species.

■ D. *p.* 3 *fòliis variegàtis* Lodd. Cat., 1836, has variegated leaves.

1184



Description, &c. The whole plant, in general appearance, strongly resembles the common spurge laurel; but the leaves are more oval, and shorter; and the flowers, which are disposed in twos instead of fives, are yellower, and of a sweeter scent. The leaves somewhat resemble those of the lemon tree, especially in colour; whence Tournefort's trivial name. When bruised, they smell like those of the elder. This fine plant was first discovered by Tournefort, on the coast of the Black Sea, on hills and in woods; and Pallas says that it is also found in Siberia, in thick woods, and in the valleys which occur between the ridges of lofty mountains. It is, generally speaking, sufficiently hardy to bear the winters of the climate of London without protection; but, being disposed to put forth its young shoots very early, they are often injured in exposed situations, by the spring frosts; "an inconvenience which probably might be avoided by planting it in thickets, and under the shelter of trees." (*Bot. Mag.*, t. 1282.) It thrives best in soil similar to that usually prepared for American plants, on the shady side of a wall, or in some other sheltered situation, where it will form a very handsome bush, 4 ft. or 5 ft. high, and 6 ft. or 8 ft. in diameter. It may be propagated by seeds or cuttings. Plants, in the London nurseries, are 1*s.* 6*d.* each.

■ 6. *D.* THYMELÆ'A *L.* The Thymelæa, *or Milkwort-like*, Daphne.

Identification. Vahl Symb., 1. p. 28.; Willd. Sp. Pl., 2. p. 416.
Synonymes. Thymelæ'a foliis polygalæ glabris *Bauh. Pin.*, 463.; *T.* alpìna glàbra, flosculis subluteis ad foliorum ortum sessilibus, *Pluk. Alm.*, 366. t. 229. f. 2.; Sanamúnda viridis vel glàbra *Bauh. Prod.*, 160.; Sanamúnda glàbra *Bauh. Hist.*, 1. p. 592.; Passerìna *Thymelæ'a Dec.*; the Wild Olive; La Thymelie, *Fr.*; astloser Seidelbast, *Ger.*
Derivation. Thymelæ'a is probably derived from *thymos*, poison, and *elaia*, or *elæa*, the olive tree, in reference to the poisonous qualities of the plant, and its slight resemblance to the olive.
Engravings. Ger. Prov., t. 17. f. 2.; Pluk. Alm., t. 229. f. 2.; and our *fig.* 1185.

Spec. Char., &c. Evergreen. Stem much branched. Branches simple, warted. Leaves lanceolate, broader towards the tip, crowded. Flowers axillary,

sessile. (*Vahl Symb.*, 1. p. 28.) A native of Spain, and of the neighbourhood of Montpelier, where it forms a shrub 3 ft. high, flowering from February to April. Introduced in 1815; but rare in collections. The leaves are of a glaucous hue; and the flowers, which are produced in clusters on the sides of the branches, are of a yellowish green; they are inconspicuous, and they are succeeded by small berries, which are yellowish when ripe. The plant requires to be kept warm and dry; and to be grown in sandy peat, kept in an equable degree of moisture. For this reason, this and other species of *Dáphne* form very suitable plants for being grown together in a daphnetum, in the same manner as the heaths in an ericetum.



1185

■ 7. *D. TA'RTON-RAI'RA* L. The Tarton-raira, *or silvery-leaved*, Daphne.

Identification. Lin. Sp., 510.; Willd. Sp. Pl., 2. p. 417.; Lodd. Cat., ed. 1836.

Synonymes. Thymelæ'a foliis candicantibus et serici instar mollibus *Bauh. Pin.*, 463.; Tarton-Raire Gallo-provinciæ Monspeliensium *Lob. Ic.*, 371.; Sanamúnda argentàta latifòlia *Barr. Ic.*, 221.; Passerina *Tárton-raira* Schrad.; the oval-leaved Daphne; Lauréole blanche, *Fr.*; Silberblättriger Seidelbast *Ger.*

Engravings. Lob. Ic., 371.; Barr. Ic., 221.; Fl. Græca, t. 354.; and our *fig.* 1186.

1186



Spec. Char., &c. Leaves persistent, obovate, nerved, silky, hoary. Flowers sessile, lateral, aggregate, imbricated with scales at the base. (*Vahl Symb.*) A native of the south of France, where it grows to the height of 3 ft., flowering from May to July. Cultivated by Miller in 1739, and now frequent in collections. This species is remarkable for the smallness and silkiness of its leaves, and the white appearance of the whole plant. The flowers are small, yellowish, sessile, and come out in thick clusters. The plant is very suitable for rockwork, as its branches are weak, irregular, and scarcely ligneous; it requires a warm dry situation, exposed to the sun. Plants, in the London nurseries, are 1*s.* 6*d.* each.

■ 8. *D.* (? *T.*) PUBE'SCENS L. The pubescent Daphne.

Identification. Lin. Mant., 66.; Willd. Sp. Pl., 2. p. 417.

Synonymes. Thymelæ'a itálica, Tarton-raire Gallo-provinciæ similis, sed per omnia major, *Micheli*, cited in *Tilli Cat. Hort. Pisani*; behaarter Seidelbast *Ger.*

Engraving. Tilli Cat. Hort. Pisani, t. 49. f. 2.

Spec. Char., &c. Stems pubescent, simple. Leaves linear-lanceolate, almost mucronate, alternate. Flowers axillary; 5, or fewer, in an axil; sessile, narrow, shorter than the leaf; the tube thread-shaped and downy. It seems different from *D. Thymelæ'a*, and was found in Austria by Jacquin. (*Willd.*) It is stated to have its leaves nearly deciduous. Introduced in 1810.

■ 9. *D.* (? *T.*) TOMENTO'SA *Lam.* The tomentose Daphne.

Identification. Lam. Dict.; N. Du Ham., 1. p. 26.

Synonymes. Passerina villòsa *Lin.*; Lauréole cotonneuse *Lam. Encyc.*, 10.

Spec. Char., &c. Flowers sessile, axillary. Leaves oblong-obtuse, covered with tomentum on both sides. (*Lam.*) A low shrub, very nearly allied to *D. Tárton-raira*, but larger in all its parts, and with more obtuse leaves, which are covered with tomentum, instead of a silky down. It is a native of Asia Minor and the Levant, and produces its white flowers in May. It was introduced in 1800, but is now probably lost.

C. *Erect. Leaves persistent. Flowers terminal.*

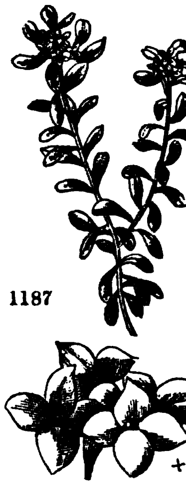
■ 10. *D.* COLLI'NA *Smith.* The hill-*inhabiting* Daphne, *or Neapolitan Mezereon.*

Identification. Smith in Fl. Græca, t. 359.; Smith Spicil., t. 18.; Willd. Sp. Pl., 2. p. 423.; Bot. Mag., t. 428.; N. Du Ham., t. 2.; Wikström Diss. de Daphné, p. 32.; Enum., p. 9.; Lodd. Cat., ed. 1836.

Synonymes. *D.* collìna α *Bot. Reg.*, t. 822., ? *D.* buxifòlia *Vahl Symb.*, 1. p. 29.; Daphné des Collines, Lauréole à Feuilles de Santé, *Fr.*; Stumpfblättriger Seidelbast, *Ger.*

Engravings. Fl. Græca, t. 359.; Smith Spicil., t. 18.; Bot. Mag., t. 428.; N. Du Ham., t. 2.; Bot. Cab., t. 1348.; and our *fig.* 1187.

Spec. Char., *&c.* Leaves obovate, glabrous and glossy above, and hirsutely villous beneath. Flowers in terminal groups. Calyx externally silkily villous; its lobes ovate, obtuse. (*Wikström*, quoted in *Bot. Reg.*, t. 822.) A low shrub, with pretty pinkish blossoms. Found abundantly on low hills, andon the banks of rivers, in the south of Italy, where it grows to the height of 3 ft., and flowers from January to June. It was first discovered by Tournefort in the Isle of Candia (the ancient Crete); and afterwards by Sir J. E. Smith in the kingdom of Naples, in 1787. It was introduced in 1752, and is frequent in collections. It well deserves a place in every daphnetum. Grafted plants, grown in a border sheltered from the north by a wall, thrive well; and form thick bushes, with nearly level heads, covered with flowers. The branches always take an upright direction, and are tipped with groups of pale pink blossoms, which are extremely fragrant, and expand very early in the spring. Price of plants, in the London nurseries, 1*s.* 6*d.* each.



1187

11. *D.* (c.) NEAPOLITA'NA *Lodd.* The Neapolitan Daphne.

Identification. Lodd. Bot. Cab., t. 719.; Lodd. Cat., ed. 1836.
Synonyme. *D.* collina β neapolitàna *Lindl.* in *Bot. Reg.*, t. 822.
Engravings. Lodd. Bot. Cab., t. 719.; Bot. Reg., t. 822.; and our *fig.* 1188.

Spec. Char., *&c.* "This pretty plant is surely a mere variety of *D.* collìna, from which it differs, as far as we can observe, after comparing the living plants, chiefly in the want of pubescence on the under surface of the leaves. Like many other plants with which the catalogues and floras of the present day are augmented, it is a sport of nature, which the ingenious acuteness of modern botanists have brought into notice; but which, if unmolested upon its native hills, *would quickly have passed away into the type from which it sprang.*" (*Lindley* in *Bot. Reg.*, t. 822.) In cultivation in British gardens since 1822. Price of plants 2*s.* 6*d.* each.

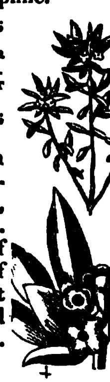


1188

12. *D.* (c.) OLEÖI'DES *L.* The Olive-like Daphne.

Identification. Lin. Mant., 66.; Schreb. Dec., 13. t. 7.; Willd. Sp. Pl., 2. p. 423.; Reich., 2. p. 194.; Sims in Bot. Mag., t. 1917.; Lodd. Cat., ed. 1836.
Synonymes. Chamædaphnöìdes crética *Alpin. Exot.*, 44. t. 43.; Thymelæ'a crética oleæ folio utriusque glabro *Tourn. Cor.*, 41.; Dáphne salicifòlia *Lam. Encycl.*, 3. p. 423.; Lauréole à Feuilles d'Olivier, *Fr.*; Oelbaumblättriger Seidelbast, *Ger.*
Engravings. Alpin. Exot., t. 43.; Schreb. Dec., 13. t. 7.; Bot. Mag., t. 1917.; Bot. Cab., t. 299.; and our *fig.* 1189.

Spec. Char., *&c.* Leaves obovate-lanceolate, terminated with a minute mucro, glabrous upon both sides. Flowers terminal, sessile, a few together, and surrounded by leaves, that in some measure involucrate them. (*Bot. Mag.*, t. 1917.) A native of Crete, where it grows to the height of 2 ft., and produces its flowers during the greater part of the year. It is less showy in its flowers than *D.* collìna, but is deserving of cultivation from its nearly glossy and pointed leaves, and neat habit of growth. It was introduced in 1815. Price of plants, in the London nurseries, 1*s.* 6*d.* each.



1189

13. *D.* (c.) SERI'CEA *Vahl.* The silky-*leaved* Daphne.

Identification. Vahl Symb., 1. p. 28.; Willd. Sp. Pl., 2. p. 423.
Synonymes. Thymelæ'a crética oleæ folio subtus villoso *Tourn. Cor.*, 41.; Dáphne oleæfòlia *Lam. Encycl.*, 3. p. 424.; Seidenartiger Seidelbast, *Ger.*

Spec. Char., &c. Leaves lanceolate, bluntish, glabrous above, villous beneath. Flowers terminal, aggregate, villous, sessile. Lobes of the calyx obtuse. It differs from *D.* (c) oleöides in its leaves being villous beneath, in the number of its flowers, and in the lobes of the calyx being oblong. (*Willd.*) A native of Candia and Naples, introduced in 1820; but we have not seen the plant. *D. sericea Don*, noticed in p. 175., is a native of the Himalayas, and is quite a different plant from that just described.

14. *D.* STRIA'TA *Trat.* The striated-*calyxed* Daphne.

Identification. Tratt.; Spreng. Syst.; 2. p. 237.

Spec. Char., &c. Leaves subspathulate-linear, sessile, tipped with a small mucro, glabrous. Flowers terminal, aggregate, sessile, glabrous, striated. Lobes of the calyx acute. A native of Switzerland and Hungary. (*Spreng. Syst.*, ii. p. 237.) This plant is said to have been introduced in 1819, and to have purplish flowers; but we have never seen it.

D. *Erect. Leaves persistent. Flowers in Racemes.*

15. *D.* GNI'DIUM *L.* The Gnidium, *or Flax-leaved*, Daphne.

Identification. Lin. Sp. Pl., 311.; Mill. Dict., n. 7.; Willd. Sp. Pl., 2. p. 420.; Lodd. Cat., ed. 1836.
Synonymes. Thymelæ'a foliis lini *Bauh. Pin.*, 463.; Spurge Flax, Mountain Widow Wayle; Daphné Gnidium, Lauréole à Panicule, *Fr.*; Rispenblättriger Seidelbast, *Ger.*
Engravings. Lodd. Bot. Cab., t. 150.; and our *fig.* 1190.

Spec. Char., &c. Evergreen. Leaves linear-lanceolate, with a cuspidate tip. Flowers in terminal, panicled racemes. (*Willd.*) A native of Spain, Italy, and Narbonne, where it grows to the height of 2 ft., and flowers from June to August. It was introduced in 1797, and is frequent in collections. An elegant little shrub, with terminal panicles of sweet-smelling pink flowers, which are succeeded by small, globular, red berries. The same deleterious properties are attributed to this shrub, as to the common mezereon. It is rather tender, but would be suitable for conservative rockwork. Dr. Lindley observes of this plant, that both it and Passerina tinctòria are used in the south of Europe to dye wool yellow. (*N. S. of Bot.*) The price of plants, in the London nurseries, is 2*s.* 6*d.* each.



1190

E. *Prostrate. Leaves persistent. Flowers terminal, aggregate.*

16. *D.* CNEO'RUM *L.* The Garland-flower, *or trailing*, Daphne.

Identification. Lin. Sp., 511., Syst., 371.; Willd. Sp. Pl., 2. p. 422.; Bot. Mag., t. 313.; Lodd. Cat. ed. 1836.
Synonymes. Cneòrum *Matth. Hist.*, 46., *Clus. Hist.*, 89.; wohlriechender Seidelbast, *Ger.*
Engravings. Jacq. Aust., 5. t. 426.; Bot. Mag., t. 313.; Bot. Cab., t. 1800.; and our *fig.* 1191.

Spec. Char., &c. Evergreen. Stems trailing. Leaves lanceolate, glabrous, mucronate. It flowers twice a year. The flowers are terminal, aggregate, sessile, red upon the upper side, and the groups of them are surrounded by leaves. (*Willd.*) It is wild in Switzerland, Hungary, the Pyrenees, Mount Baldo, Germany, and France, where it grows a foot high, and flowers in April and September.

Varieties.

D. C. 2 *fòliis variegàtis.* — The leaves have a narrow portion of yellow at the edges.

D. C. 3 *flòre álbo.*—Clusius, in his *Hist.*, has stated that the species varies with white flowers. (*Willd. Sp. Pl.*)

Description, &c. This plant is seldom more than a foot high, but it is ornamented by numerous pinkish flowers, which are disposed in terminal umbels, and are remarkably fragrant. The berries are white, small, and globose, but they are seldom produced in England. The plant is valuable for rockwork, and growing in pots, on account of its dwarf habit,



1191

and the beauty and delightful fragrance of its flowers. It is commonly propagated by layers, and it thrives best in peat soil, kept rather moist.

App. i. *Half-hardy Species of* Dáphne.

■ D. *odòra* Thunb. Fl. Jap., 159., Banks Ic. Kæmpf., t. 16., Ait. Hort. Kew., ii. p. 26., N. Du Ham., i. p. 28., Lodd. Cat., ed. 1836; *D. sinénsis Lam. Dict.*; the sweet-scented Daphne, Lauréole de Chine, Daphné odorant, *Fr.*; wohlriechender Seidelbast, *Ger.*; has the leaves lanceolate, thin, and glabrous; and the flowers terminal and sessile. (*Lois.* in *N. Du Ham.*, i. p. 28.) It is a native of China and Japan, which was introduced into Britain in 1771, and forms an erect shrub, greatly resembling *D.* póntica in general appearance. The branches are glabrous, and the flowers, which are disposed in terminal umbels, are remarkably sweet. The flower buds are pink in their exterior, and the petals of the flowers, after expansion, are pink on the outside, though they are white within. *D.* odòra was first brought to England by Benjamin Torrens, Esq., and being confounded with the *D.* indica of Linnæus, from which it differs in having sessile flowers and alternate leaves, it was at first kept in the stove. By degrees it was tried in a green-house, and is now found to stand in the open air in sheltered situations. Du Hamel classes it with the myrtle and the orange as to hardiness. There is a plant in the Horticultural Society's Garden, which has stood out since 1832.



1912

Varieties.

■ D. *o.* 2 *variegàta* Lodd. Cat., ed. 1836, has variegated leaves, and quite white flowers.

■ D. *o.* 3 *rùbra* D. Don, Brit. Fl. Gard., 2d ser., t. 320., and our *fig.* 1192., has lanceolate leaves, and flowers of a rich deep pink colour. The flowers are produced at the extremities of the shoots; "they are of a dark red in the bud state, but become paler and glossy after expansion, and they are then highly fragrant." There are plants in the nursery of Mr. G. Smith, at Islington, which appear very nearly hardy, having borne a considerable degree of frost without protection. (See *Gard. Mag.*, xii. p. 75.)

■ D. *hýbrida* Swt. Brit. Fl. Gard., 1st ser. t. 200., Bot Reg. t. 1177., and our *fig.* 1193.; the *D.* delphínia of the French gardeners; and the *D.* dauphínii, or dauphin's daphne, of the English gardeners; has the branches pubescent when young, but afterwards becoming glabrous. Leaves alternate, oblong-elliptic, glossy above, and pubescent beneath. Flowers in terminal groups, nearly sessile, and covered on the outside with silky hairs. (*Swt. Brit. Fl. Gard.*) This is a highly esteemed kind, and one that is much propagated in the London nurseries. It grows freely, has large handsome glossy leaves, and produces its purplish flowers, which have a most delightful fragrance, in great abundance. It is supposed to be a hybrid between *D.* collina and *D.* odòra; but it is not known when, or by whom, it was originated. It is generally kept in the green-house, but would succeed perfectly in the open air, if planted in light sandy soil, against a south wall where it could be protected in very severe weather. It flowers under glass in February, but would probably be a month or six weeks later in the open ground. (*Sweet* and *Lindl.*)



1193

■ D. *índica* L., the Indian or Chinese daphne, is a small shrub, with acute entire leaves, and terminal sessile flowers. Introduced in 1800, but much more tender than either of the preceding species.

■ D. *papyràcea* Wal., *D.* cannábina *Wal.*, is a Nepal species, from the inner bark of which a soft kind of paper has been made in India. It was introduced in 1824.

Genus II.



DI'RCA *L.* The Dirca, *or Leather-wood.* *Lin. Syst.* Octándria Monogýnia.

Identification. Lin. Amœn. Acad., 3. p. 12.; N. Du Ham., vol. iii. p. 193.; Bot. Reg., t. 292.
Synonyme. Thymelæ'a *Gron. Virg.*, 155.
Derivation. From *dirkē*, a fountain; from the plant growing in watery places.

■ 1. D. palu'stris *L.* The Marsh Dirca, *or Leather-wood.*

Identification. Lin. Amœn. Acad., 3. p. 12.; Willd. Sp. Pl., 2. p. 424.; Bot. Reg., t. 292.; N. Du Ham., iii. p. 193.; Lodd. Cat., ed. 1836.
Synonymes. Moorwood; Bois de Cuir, Bois de Plomb, *Fr.*; Sump. Lederholz *Ger.*
Engravings. Lin. Amœn. Acad., 3. t. 1. f. 7.; Du Ham. Arb., 1. t. 212.; Bot. Reg., t. 292.; and our *fig.* 1194.

Description, &c. A low deciduous shrub with the habit of a miniature tree, a native of Virginia, where it grows about 5 ft. or 6 ft. high, producing its yellow flowers in March and April. It was introduced in 1750, and is common in collection of peat-earth shrubs. It has a branchy and fastigiate habit, and has a tumidity at the base of each branch on the under side. The bark is brown and glabrous. Linnæus has remarked that the wood and bark are so tough, that it is scarcely possible to divide the substance of either without a knife, and this quality has obtained for the plant the English name of leather-wood. The leaves are lanceolate, oblong, alternate, of a pale green, villous beneath, and deciduous. The flowers are produced while the plant is leafless, and, in England, they are seldom, if ever, followed by seeds. The bud of the shoot of the same year is enclosed in the bud of the inflorescence. The young plants are very liable to be eaten by snails. (*Bot. Reg.*) Though quite a tree in its habit of growth, it is rarely seen in England above 3 ft. high. In Canada, the twigs are used for rods, and the bark for ropes, baskets, &c., for which it is very suitable, being equal in strength and toughness to the bark of the lime tree. In British gardens, D. palústris is propagated by layers, which require two years to root properly. The soil in which the plant grows best is peat kept moist. Price of plants, in the London nurseries, 5*s.* each; at Bollwyller, 3 francs; and at New York, 25 cents.



1194

App. I. *Half-hardy ligneous Plants belonging to the Order* T*hymelàceæ.*

Gnidia imbricàta L.; *G.* denudàta *Bot. Reg.*, t. 757.; has grey villous leaves, and pale yellow flowers. There were plants of this species in Knight's Exotic Nursery, King's Road, Chelsea, in 1830, one of which was upwards of 4 ft. high.

Passerina filifórmis L. is a plant well known in old collections. It is a native of the Cape of Good Hope, which was introduced in 1752; and in a conservatory it will grow to the height of 8 ft. It has slender, twiggy, spreading branches, which have the leaves imbricated along their terminal parts in 4 rows. It bears its white flowers plentifully on the terminal parts of the branches. Nearly all the species of Passerina are low shrubs, natives of the Cape of Good Hope, which might probably stand out against a conservative wall.

Pimelèa drupàcea Lab., Bot. Cab., t. 540., the cherry-fruited pimelea, is tolerably hardy. It is an evergreen shrub, about 2 ft. high, a native of New Holland, which was introduced in 1817. Its flowers, which are white, are produced in May, and they are succeeded by a berry-like sessile fruit, which is quite black when ripe, and has a striking appearance on the plant when produced abundantly.

CHAP. XCVI.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER *SANTALA'CEÆ.*

The only hardy genus is Nýssa L., to which the following character belongs: —

NY'SSA L. Flowers bisexual and male: the two kinds upon distinct plants, and without petals.—Bisexual flower. Calyx connate, with the ovary in its lower part; it has a free 5-parted limb. Stamens 5. Ovary ovate, containing 1 pendulous ovule (2 in some instances, *Nuttall*). Style simple, revolute (curved inwards, Rees's *Cyclop.*). Stigma acute. Fruit a roundish drupe: nut elliptical, acute, angular, somewhat irregular, grooved lengthwise, contain-

ing 1 seed which is albuminous, and has an embryo that has large leafy cotyledons and a superior radicle. — Male flower. Calyx 5-parted, spreading. Stamens 5, 8, 10, and 12; surrounding a shield-shaped gland (? an unformed pistil).—Trees. Leaves alternate, entire. Inflorescence axillary, peduncled, of 1 flower, or several aggregate flowers. ? The male flowers in a corymb. Fruit red or blackish purple, suffused with a frosty appearance. (*Nutt. Gen.*, *Lindl. N. S. of Bot.*, *Rees's Cycl.*, other sources, and observation.)

OSY'RIS *L.* Flowers apetalous, unisexual, at least in effect; those of the 2 sexes upon distinct plants.—Male. Flowers borne in lateral racemes, about 3—5 in a raceme, and disposed in 1—2 pairs, with a terminal odd one. Calyx spreadingly bell-shaped, 3-parted; its æstivation valvate. Nectary disk-like, 3-cornered. Stamens 3, arising from the nectary, alternate to its angles, and opposite to the lobes of the calyx; anthers of 2 separate lobes that open inwards. (*T. Nees ab E.*) Scopoli (*Fl. Carn.*) has seen the rudiments of an ovary, and of styles, in the male flower. (*Willd. Sp. Pl.*) — Female. Flowers solitary. Calyx urceolate; its tube connate with the ovary; its limb free, 3-cleft. Style single. Stigmas 3. There are not any rudiments of stamens. (*T. Nees ab Esenb.*) Rather the flower is bisexual, but it does not bear seed unless a male plant is contiguous. (*Willd. Sp. Pl.*) Fruit globose, fleshy exteriorly, crowned by the limb of the calyx, and the remains of the style. Carpel with crustaceous, brittle walls. Seed affixed by its base. Embryo incurved, in the centre of fleshy albumen.—*O.* álba *L.*, the only known undisputed species, is a shrub with twiggy branches, alternate, linear-lanceolate, small leaves, white flowers, and red fruit. (*T. Nees ab Esenbeck Gen. Pl. Floræ Germanicæ.*)

GENUS I.



NY'SSA L. THE NYSSA, *or* TUPELO TREE. *Lin. Syst.* Polygàmia Diœ'cia; or rather, according to Smith in Rees's *Cyclopædia*, Decándria Monogýnia.

Identification. Lin. Gen., 551.; Lin. Gen., ed. Schreb., No. 1599.; Willd. Sp. Pl., 4. p. 1112.; Mill. Dict. v. 3.; Rees's Cyclop.

Derivation. From *Nyssa*, a water nymph so called; a name given to this plant by Linnæus, because "it grows in the waters." (*Hort. Cliff.*) Tupelo appears to be an aboriginal name.

Description, &c. Deciduous trees, natives of North America, and, though several sorts have been described by botanists, probably all referable to two, or at most three, species: viz. N. biflòra, N. cándicans, and N. tomentòsa, the last two being very nearly allied. In the case of Nýssa, as in those of *Fráxinus* and Quércus, there are seeds of several alleged species procured from America; and though plants from these may come up tolerably distinct, we do not consider that circumstance sufficient to constitute each sort a species. The trees of this genus are of little use for their timber; but the fruit of N. cándicans, N. tomentòsa, and N. denticulàta, gathered a little before maturity, and preserved with sugar, forms an agreeable conserve, tasting somewhat like cranberries. (*Nuttall Gen.*). In British gardens, two or three of the sorts occasionally occur; but they are not common in collections. The largest nyssa that we know of in England is at Richmond, where, in 1836, it was 45 ft. high. The trees which have flowered in England have, as far as we are aware, only produced male blossoms; but, to compensate for the want of fruit, the foliage of all the species of the genus dies off of an intensely deep scarlet. The different sorts are almost always raised from seeds; and seeds with the names of N. denticulàta, N. tomentòsa, N. aquática (N. biflòra), N. cándicans, and N. sylvática, according to Charlwood's *Catalogue* for 1836, are sold at 1*s.* a packet. Plants, in the London nurseries, are 2*s.* 6*d.* each; at Bollwyller 2 francs; and at New York, from 25 cents to 1 dollar.

♀ 1. N. BIFLO'RA *Michx.* The twin-flowered Nyssa, *or Tupelo Tree.*

Identification. Michx. Fl. Bor. Amer., 2. p. 259.; Willd. Sp. Pl., 4. p. 1113.
Synonymes. N. aquática *Lin. Sp. Pl.*, 1511., *Hort. Cliff.*, 462., *Du Roi Harbk.*, 1. p. 444., *Michx. N. Amer. Syl.*, iii. p. 36.; N. caroliniàna *L.*; N. integrifòlia *Ait. Hort. Kew*, 3. p. 446., *Smith* in *Rees's Cyclop.*; N. pedúnculis unifloris *Gron. Virg.*, 121.; Mountain Tupelo, *Mart. Mill.*; Gum Tree, Sour Gum Tree, Peperidge, *Amer.*
Engravings. Catesb. Car., 1. t. 41.; Pluk. Alm., t. 172. f. 6.; and our *figs.* 1195, 1196.

Spec. Char., &c. Leaves ovate-oblong, entire, acute at both ends, glabrous. Female flowers two upon a peduncle. (*Willd. Sp. Pl.*, iv. p. 1113.) The drupe is short and obovate, and the nut striated. (*Michaux.*) A decidu-

1195



1196



ous tree, a native of Virginia and Carolina, in watery places, where it grows to the height of 40 ft. or 45 ft.; flowering in April and May. It was introduced in 1739, and is one of the most common sorts in British collections. The tupelo tree is most abundant in the southern parts of New York, New Jersey, and Pennsylvania, where it grows only in wet ground; having a clear stem, of a uniform size, from the base to the height of 5 ft. or 6 ft., where it throws out horizontal branches. On old trees the bark is "thick, deeply furrowed, and, unlike that of every other tree, divided into hexagons, which are sometimes nearly regular." (*Michx. N. Amer. Syl.*, iii. p. 37). The leaves are smooth, slightly glabrous below, and often united in bunches at the extremity of the young lateral shoots. The flowers are small, and scarcely apparent; but the fruit, which is always abundant, and attached in pairs, is of a deep blue colour, and is ornamental, remaining on the tree after the falling of the leaf, and affording food for birds. "The tupelo holds a middle place between trees with hard and those with soft wood. When perfectly seasoned, the sap-wood is of a light reddish tint, and the heart-wood of a deep brown. Of trees exceeding 15 in. or 18 in. in diameter, more than half the trunk is hollow." (*Michx.*) The timber of the tupelo is of little value, but, from its peculiar organisation (the fibres being united in bundles, and interwoven like a braided cord), it is extremely difficult to split. It is on this account much esteemed in America for wooden bowls. As fuel, it burns slowly, and diffuses a great heat. "At Philadelphia, many persons, when making their provision of wood for the winter, select a certain proportion of the tupelo, which is sold separately, for logs." (*Michx.*). In British gardens it does not appear that much pains have ever been taken to encourage the growth of this or any other species of Nýssa; for though there are abundance of plants to be procured in the nurseries, yet there are very few of a tree-like size to be seen in pleasure-grounds. The largest tupelo tree that we know of in England is at the Countess of Shaftesbury's villa at Richmond, where it is 45 ft. high, and has a trunk 1 ft. 4 in. in diameter. There are, also, a tree in Lee's Nursery 20 ft. high; one in the grounds of the villa of the late Mr. Vere, at Kensington Gore, about 15 ft. high; one at the Duke of Wellington's, at Strathfieldsaye, 30 ft. high; and some at White Knights; from all of which, except that at Lady Shaftesbury's, we have received specimens when in flower, and all these were male blossoms. At Schwöbber, in Hanover (see p. 148.), there is a nyssa 40 ft. high. To insure the prosperity of the tree, it ought always to be planted in moist peat, or near water. The trees at Strathfieldsaye and at Schwöbber are in moist meadows, on a level with the water of adjoining rivers.

♀ 2. N. (B.) VILLO'SA *Michx.* The hairy-*leaved* Nyssa, *or Tupelo Tree.*

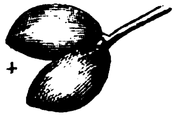
Identification. Michx. Fl. Bor. Amer., 2. p. 258.; Willd. Sp. Pl., 4. p. 1112.; Pursh Fl. Amer., Sept., 1. p. 177.
Synonymes. N. sylvática *Mich. N. Amer. Syl.*, 3. p. 33., *Lodd. Cat.*, ed. 1836; N. multiflòra *Wangenh. Amer.*, 46. t. 16. f. 39.; N. montàna *Hort.*; N. pedúnculis multiflòris *Gron. Virg.*, 121.; Sour Gum Tree, Black Gum, Yellow Gum, *Amer.*; haariger Tulpelobaum, *Ger.*
Engravings. Wangenh. Amer., t. 16. f. 39.; Michx. N. Amer. Syl., 3. t. 110.; and our *figs.* 1197, 1198.

Spec. Char., *&c.* Leaves oblong, entire, acute at both ends; with the petiole, midrib, and edge villous. Female flowers, about three upon a peduncle. (*Willd. Sp. Pl.*, iv. p. 1113.) Peduncle of female flowers long,

1197



and for the most part two-flowered. Nut small, ovate, obtuse, striated. (*Michx.*) A deciduous tree, a native of North America, where it grows from 60 ft. to 70 ft. high, and flowers in April and May. It was introduced in 1824, and is occasionally to be met with in collections.



1198

N. sylvática *Michx.*, which we have made synonymous with N. villòsa, on the authority of Pursh (see *Fl. Amer. Sept. Addenda*, ii. p. 175.), is said by Michaux to exhibit a remarkable singularity in its vegetation. " In Maryland, Virginia, and the western states," he observes, " where it grows on high and level ground with the oaks and the walnuts, it is distinguished by no peculiarity of form: but in the lower part of the Carolinas and of Georgia, where it is found only in wet places, with the small magnolia or white bay (Magnòl*ia* glaúca), the red bay (*La*úrus carolinénsis), the loblolly bay (Gordòn*ia* Lasiánthus), and the water oak (Qu*é*rcus aquática), it has a pyramidal base, resembling a sugar loaf; a trunk 18 ft. or 20 ft. high, and 7 in. or 8 in. in diameter, at the surface of the ground; which, a foot higher, is only 2 in. or 3 in. thick; the proportions, however, varying in different individuals." (*N. Amer. Syl.*, iii. p. 34.) This tree appears to differ very little from N. biflòra, except in the greater height attained by the tree, and in the downiness of the petioles of the leaves. The fruit is of the same size and colour, generally produced in pairs on similar peduncles, and the wood is of the same description, fine-grained, but tough. " The alburnum of the trunks of trees growing upon dry and elevated lands is yellow; and this colour, being considered by wheelwrights as a proof of the superior quality of the wood, has probably given rise to the name of yellow gum, which is sometimes applied to this species." (*Ibid.*) The wood is used for all purposes, for which timber is required of moderate dimensions, which is not liable to split. The only plant which we have seen of this kind is in the arboretum of Messrs. Loddiges, where, in 1835, it was 10 ft. high, and had produced male blossoms; but it died in the spring of 1836, apparently from the soil being too dry.

¥ 3. N. CA'NDICANS *Michx.* The whitish-*leaved* Nyssa, *or Ogechee Lime Tree.*

Identification. Michx. Fl. Bor. Amer., 2. p. 259.; Willd. Sp. Pl., 4. p. 1113.
Synonymes. N. capitàta *Walt.*, *Ait. Hort. Kew*, *Michx. N. Amer. Syl.*, 3. p. 43.; N. coccinea *Bartram*; Sour Tupelo Tree, Ogechee Lime Tree, Wild Lime; weisslicher Tulpelobaum, *Ger.*
Engravings. Michx. N. Amer. Syl., 3. t. 113.; and our *fig.* 1199.

Spec. Char., *&c.* Leaf with the petiole very short, and the disk oblong, wedge-shaped at the base, nearly entire, whitish on the under surface. Female flowers one upon a peduncle. (*Willd. Sp. Pl.*, iv. p. 1113.) It varies, with its leaves obovate, entire, or rarely subdentate. The male flowers are grouped into little heads. The bracteas attending the female flowers are short; the calyx of these flowers is tomentose; its lobes are short. The drupe is oblong. (*Michaux.*) A deciduous tree, a native of Carolina, on the



1199

banks of rivers, particularly the Ogechee. It is the smallest tree of the genus, rarely exceeding 30 ft. in height. It was introduced in 1806.

The leaves are 5 in. or 6 in. long, oval, rarely denticulated, of a light green above, and glaucous beneath. The flowers are similar to those of the large tupelo (N. grandidentàta), but the sexes are borne by separate trees; and Michaux remarks, "as a peculiarity witnessed in no other tree of North America, that the male and female trees are easily distinguished by their general appearance when the leaves have fallen. The branches of the male are more compressed about the trunk, and rise in a direction more nearly perpendicular; those of the female diffuse themselves horizontally, and form a larger and rounder summit. The fruit is supported by long peduncles, and is about 1½ in. in length, of a light red colour, and of an oval shape. It is thick-skinned, intensely acid, and contains, like that of the large tupelo, a large oblong stone, deeply channeled on both sides." (*Michx. N. Amer. Syl.*, iii. p. 43, 44.) This appears to be the kind of N*ý*ssa mentioned in Martyn's *Miller*, as not then introduced, but which is said to be described by Mr. Humphry Marshall, from Bartram's catalogue, "as a tree of great singularity and beauty, rising to the height of 30 ft.; the fruit of which is of a deep scarlet colour, and of the size of a damascene plum. It has an agreeable acid taste, whence it is called the lime tree." Professor Martyn adds that Bartram calls it Nýssa coçcínea, and observes that there is no tree which exhibits a more desirable appearance than this, in the autumn, when the fruit is ripe, and the tree is partly divested of its leaves; for then "the remainder looks as red as scarlet, and the fruit is of that colour also." It is the shape of the olive, but larger, and contains an agreeable acid juice. "The most northern habitation of this tree yet known," he adds, "is on the great Ogechee, where it is called the Ogechee lime, from its acid fruit being about the size of limes, and being sometimes used in their stead." There is a plant, bearing the name of N. capitàta, in the arboretum of Messrs. Loddiges, 6 ft. or 7 ft. high; which, from its foliage, we have no doubt, is indentical with Michaux's figure.

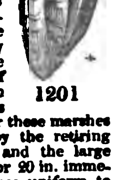
¶ 4. N. GRANDIDENTA'TA *Michx.* The deeply-toothed-*leaved* Nyssa, *or Large Tupelo Tree*

Identification. Michx. N. Amer. Syl., 3. p. 40.
Synonymes. N. tomentòsa, and N. angulizans, *Michx. Fl. Bor. Amer.*, 2. p. 259.; N. denticulàta *Ait. Hort. Kew.*, 3. p. 446., Willd. Sp. Pl., 4. p. 1114.; N. angulòsa *Poir.*; N. uniflòra *Wangenh. Amer.*, p. 83.; Wild Olive, *Amer.*; Virginian Water Tupelo, *Mart. Mill.*
Engravings. Wangenh. Amer., t. 27. f. 57.'; Catesb. Car., 1. t. 60.; Michx. N. Amer. Sylva, 3. t. 112.; and our *figs.* 1200, 1201.

Spec. Char., &c. Leaf with a long petiole, and a disk that is oblong, acuminate, distantly serrate. Female flowers one upon a peduncle. (*Willd. Sp. Pl.*, iv. p. 1114.) The leaves are invariably toothed with large pointed teeth. The bracteas are rather longer than the ovary. The lobes of the calyx are wedge-shaped. The drupe is oblong. (*Michaux.*) A deciduous tree, a native of North America; which Michaux calls the most remarkable species of its genus for height and diameter; and which was introduced into Britain in 1735. It grows chiefly in the southern parts of the United States; and Michaux observes that it is always found in company with the long-leaved pine (Pinus palústris) and the cypress (Taxòdium distichum). In South Carolina and Georgia these trees are constantly found growing with the over-cup oak (Quércus lyràta), the water locust (Gleditsch*ia* monospérma), the cotton wood (*Pó*pulus canadénsis), the Carolinian poplar (*Pó*pulus angulàta), and the water bitter-nut hickory (*Cà*rya aquática); intermixed with which they compose the dark impenetrable forests which cover the miry swamps on the borders of the rivers, to the distance of 100 to 200 miles from the ocean. The presence of these trees is considered an infallible proof of the depth and fertility of the soil, and, consequently, of its fitness for the culture of vine. "The rivers, at their annual overflowing, sometimes cover these marshes to the height of 5 ft. or 6 ft., as is shown by the marks left upon the trees by the retiring waters. Vegetation seems only to acquire new energy from these inundations, and the large tupelo sometimes attains the height of 70 ft. or 80 ft., with a diameter of 15 in. or 20 in. immediately above its conical base, and 6 ft. or 7 ft. from the ground. This size continues uniform to the height of 25 ft. or 30 ft. At the surface the trunk is 8 ft. or 9 ft. thick. (*Michx. N. Amer. Syl.*, iii. p. 41.) The leaves of the large tupelo are commonly 5 in. or 6 in. long, and 2 in. or 3 in. broad; but on young and thriving plants they are of twice these dimensions. They are of an oval shape, and are garnished with two or three large teeth, which are irregularly placed, and generally only on one side of the leaf. When the leaves unfold in spring, they are downy; but they become smooth on both sides as they expand. The flowers are numerous though single, and are succeeded by fruit of considerable size, and of a deep blue colour, of which the stone is depressed, and very

1200





1201

distinctly striated. The wood is extremely light and soft; and as, in the arrangement of its fibres, it resembles other species of the same genus, it is employed for making bowls and trays. The roots, also, are tender and light, and they are used by fishermen to buoy up their nets with, instead of cork. (*Ibid.*) This species is described in Martyn's *Miller* as the Virginian water tupelo tree, rising, with a strong upright trunk, to the height of 80 ft. or 100 ft., and dividing into many branches towards the top. The drupes, Professor Martyn adds, "are nearly the size and shape of small olives, and are preserved as that fruit is, by the French inhabitants of the Mississippi, where this species of Nýssa greatly abounds, and is called the olive tree. The timber is white and soft when unseasoned, but light and compact when dry; which renders it very proper for bowls, &c." It sometimes varies, in having the leaves quite glabrous, and less deeply toothed.

Genus II.

OSY'RIS *L.* THE OSYRIS, *or* POET'S CASIA. *Lin. Syst.* Diœ'cia Triándria.

Identification. Lin. Gen. Pl.; Willd. Sp. Pl., 4. p. 715.
Synonyme. Càsia *Camer.*, *Lob.*, *Alpin.*, *Gesn.*
Derivation. The *Osuris* of Pliny and Dioscorides is so named from *osos*, a branch; from the length and pliability of the branches.

1. *O.* A'LBA *L.* The white-*flowered* Osyris, *or Poet's Casia.*

Identification. Lin. Sp. Pl., 1450.; Willd. Sp. Pl., 4. p. 715.; Roy. Lugdb., 202.; Sauv. Monsp., 56.; Gouan Monsp., 502.; Gron. Orient., 306.; Mill. Dict., No. 1.; Scop. Carn., No. 1215.
Synonymes. O. fòliis lineáribus acùtis *Lœfl. It.*, 169.; O. frutéscens baccífera *Bauh. Pin.*, 212.; Càsia poética Monspeliénsium *Cam. Epit.*, 26., *Lob. Ic.*, 432.; Càsia Latinòrum *Alp. Exot.*, 41.; Càsia Monspèlii dicta *Gesn. Epit.*, 50.; weisse Osyris, *Ger.*
Engravings. Lam. Ill., t. 802.; T. Nees ab Esenbeck Gen. Plant. Fl. Ger. Ic. et des Illust., t. 20.; and our *fig.* 1202.



1202

Spec. Char., &c. A shrub 3—4 ft. high. Stem roundish, striated. Leaves alternate, linear-lanceolate, 1 in. long, entire, glabrous. Flowers upon the branchlets, peduncled. Drupe red, of the size of a pea. (*Willd.*) A native of Italy, Spain, Montpelier, Libanus, and Carniola. Introduced in 1793, and cultivated by Miller; but we have not seen the plant. The long supple branches of this tree were formerly used for brushes, and they are still used in making crates, or packing-cases in the south of Europe. It is celebrated by Keats for the whiteness of its flowers:—

> ——— "A dimpled hand,
> Fair as some wonder out of Fairy-land,
> Hung from his shoulder: like the drooping flowers
> Of whitest casia, fresh from summer showers." *Poems*, p. 24.

CHAP. XCVII.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER ELÆAGNA'CEÆ.

THEY are included in three genera, *E*læágnus *Tourn.*, *H*ippóphae *L.*, and Shephérd*ia Nutt.*; and these have the following characters:—

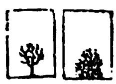
ELÆA'GNUS Tourn. Flowers, some bisexual; some, in result, male only; both kinds upon one plant.—Bisexual flower. Calyx resembling, internally, a corolla; tubular below, bell-shaped above, with a slightly spreading, lobed, deciduous limb; the lobes mostly 4; the tubular part includes, but is not connate with, the ovary and part of the style, and bears at its mouth a conical crown, through which the style passes. Style long. Stigma clavate or coiled. Stamens arising from the bottom of the bell-shaped part, shorter than it, alternate with its lobes, the filaments adnate to it, except at their tip. Ovary oblong. Ovule 1. Fruit consisting of an achenium, and of the tubular part of the calyx rendered fleshy, and including the achenium. Seed erect. Embryo erect. — Male flower. Calyx resembling, internally, a corolla, bell-shaped; it has a limb of 4—6—8 lobes. Stamens of the number of the lobes; otherwise as in the bisexual flower. A conical crown

surrounds the style of an abortive pistil. — Species several; arborescent or shrubby; inhabitants of Ceylon, Nepal, Japan, south of Europe, and North America. The fleshy part of the fruit is, in some, eatable. Leaves alternate, entire, bearing, as does the bark of growing shoots, scales, or stars of hairs. Flowers axillary, pediceled. (Chiefly *T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.*, whose elucidation relates to *E.* angustifòlia *L.; Lindley;* and *Ach. Rich.*)

HIPPO'PHAE L. Flowers unisexual, those of the two sexes upon distinct plants. — Male flower. Calyx arched, seeming as if constituted of 2 leaves connate at the tip. Stamens 4, not extended out of the calyx. — Female flower. Calyx tubular, cloven at the top, including the ovary, and becoming eventually succulent. Ovary of 1 cell. Ovule 1. Style short. Stigma long, with a longitudinal furrow. Fruit consisting of a polished achenium, that has a slight furrow on one side, and of the calyx, now enlarged, and succulent with an acid juice. Seed erect. Embryo erect. — Two species are known, one wild in Europe, the other in Nepal. The European one is partially spiny. Both have leaves narrow, entire, scaly, and silvery, especially beneath. The succulent part of the fruit is eatable. (*T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.; Smith, Eng. Flora;* and obs.)

SHEPHE'RD*IA* Nutt. Flowers unisexual; those of the two sexes upon distinct plants. — Male flower. Calyx 4-cleft. Stamens 8, included, as to length, within the calyx; alternate with 8 glands. — Female flower. Calyx bell-shaped, its limb 4-parted, flat, the portions equal; its tube ? adnate to the ovary. Ovule 1. Style 1. Stigma oblique. Fruit as in *H*ippophae.—Two species are known, both natives of North America, and having the aspect of *Elæágnus*; one a small tree, the other a shrub. Their leaves are entire, and bear scales. Male flowers ? laterally aggregate, in groups that resemble a catkin. Female flowers smaller than the male ones, shortly pedunculate (*Nutt. Gen.*): racemose at the ends of the branches (*Lindley* in *Encyc. of Pl.; Nuttall.*).

GENUS I.



ELÆA'GNUS Tourn. THE ELÆAGNUS, *OLEASTER, or WILD OLIVE TREE. Lin. Syst.* Tetrándria Monogýnia.

Identification. Tourn. Cor., 51.; Ach. Rich. Monogr., p. 96.; T. Nees ab Esenbeck, Gen. Pl. Fl. Germanicæ; N. Du Ham., 2. p. 87.

Synonymes. Chalef, *Fr.*; Wilde Oelbaum, *Ger.*

Derivation. "The *elaiagnos* of Theophrastus was a plant with hoary leaves, growing in marshy places in Arcadia, and was probably a species of Sàlix, although certainly not *S.* babylónica, as Sprengel has stated it to be. It was named from its resemblance to the *elaia*, or olive, from which it differed in not bearing fruit. Dioscorides writes *elæagros*, which means the wild olive; and some botanists have adopted this reading, which is most likely the true one. The plants to which the name *Elæágnus* is now applied are also something like the olive. The French call the *Elæágnus*, chalef; a slight alteration, according to Golius, of *khaléf*, the Arabic name of the willow; but more probably of *kalaf*, the Persian name of the *Elæágnus* itself." (*Lindley* in *Bot. Reg.*, t. 1156, adapted.) Oleaster is a Latin word, which is interpreted a wild olive tree; and perhaps it is derived from *olea*, an olive tree, and *instar*, likeness.

Description, &c. Deciduous shrubs, or low trees; natives of the south of Europe, the Levant, the Himalayas, and North America. In British gardens, there are two or three species which grow freely in any soil tolerably dry, and are readily propagated by seeds, layers, or cuttings.

♀ 1. *E.* HORTE'NSIS *Bieb.* The Garden Elæagnus, *Oleaster, or Wild Olive Tree.*

Identification. Bieb. Fl. Taur. Cauc., p. 113.

Synonymes. *E.* angustifòlia *L., Willd. Sp. Pl.*, 1. p. 688., *Ræm. et Schult. Syst. Veg.*, 3. p. 478., *Pall. Fl. Ross*, p. 10. t. 4., *N. Du Ham.*, 2. p. 87., *Bot. Reg.*, t. 1156.; *E.* inérmis *Mill. Dict.*, No. 2.; *E.* argénteus *Mœnch Meth.*, p. 638.; *E.* orientàlis *Delisle*; ? *E.* argéntea *Wats. Dend. Brit.*, t. 161.; Jerusalem Willow; Olivier de Bohème, Chalef à Feuilles étroites, *Fr.*; schmalblättriger Oleaster, *Ger.*

Engravings. Pall. Ross., 1, t. 4.; N. Du Ham., 1. t. 89.; Bot. Reg., t. 1156.; our *fig.* 1203., and the plate in our last Volume.

Spec. Char., *&c.* A tree, growing to the height of from 15 ft. to 20 ft. Leaves lanceolate, hoary all over, as are the shoots of the current year, with stars of hairs of a hoary colour. Branches brown and smooth, more or less spiny. Leaves 2—3 in. long; upon the upper surface whitish green, and upon the under one very hoary. Flowers 2 or 3 together, axillary, upon short peduncles, fragrant; bisexual flower 4-cleft, interior of a pale yellow; male ones 5 or more cleft, interior of a golden yellow. Both are furnished on the exterior with stars of hairs, like the under surface of the leaves. Fruit of a red-brown colour, something like a small date. A native of the south of Europe, in Bohemia, France, Spain, the Levant, Tartary, and various parts of Asiatic Russia; flowering in May, and ripening its fruit in August. It was introduced in 1633, and is frequent in collections. The silvery whiteness of the foliage of this tree renders it a most conspicuous object in plantations; and hence, in any view where it is wished to attract the eye to a particular point, it may be usefully employed. For example, suppose a villa surrounded by grounds perfectly flat, with a boundary strip of plantation, or shrubbery, in the middle distance, a monotonous third distance, in which there is no object of interest but the spire of a church, and that scarcely perceptible over the tops of the trees of the plantation: plant one or two trees of elæagnus in that part of the plantation over which the eye sees the spire, and they will, by the light colour of their foliage, attract the eye in that direction. This tree, which is called by the Portuguese the tree of Paradise, is also remarkable for the fragrance of its blossoms, which are produced in great abundance in May, and perfume the air for a considerable distance around. For this reason it is a most desirable tree for a lawn or shrubbery. There are good specimens in the Horticultural Society's Garden; but the finest trees that we have seen, were, in 1815, in the grounds of Malmaison, near Paris, where they were nearly 30 ft. high, and with heads nearly as much in diameter. In the Levant, the fruit of the cultivated varieties, *E.* h. orientàlis and dactylifórmis, is made into preserves, and also dried like pistachia nuts. The plant requires a sheltered situation, and, to attain any size, must be planted in a good soil. Price of plants, in the London nurseries, 2*s.* 6*d.* each; at Bollwyller 1 franc 50 cents; and at New York, 1 dollar.



1203

Varieties. Bieberstein, in his *Fl. Taur. Cauc.*, i. p. 112, 113., as quoted in *Ræm. et Schult. Syst.* and *Bot. Reg.*, has comprehended under one species several forms, some of which are treated of as specifically distinct by Linnæus and other botanists. He gives *E.* horténsis as the name of the species, which he considers to exist under the four following forms: —

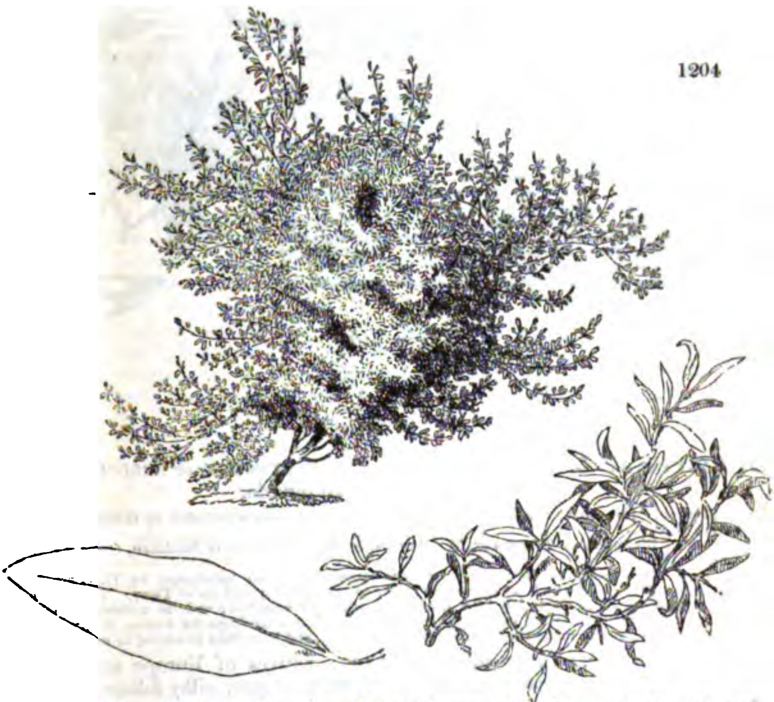
- ♆ E. *h.* 1 *angustifòlia* Bieb., *E.* angustifòlia *L.*—Leaves lanceolate, shining. Fruit insipid. This is the most common sort in British gardens. There is a tree of it in the Horticultural Society's Garden, 20 ft. high; and one at Kew, 8 ft. high.
- ♆ E. *h.* 2 *dactylifórmis.*—Leaves lanceolate, shining. Fruit date-shaped, eatable.
- ♆ E. *h.* 3 *orientàlis*, *E.* orientàlis *L.*, *Pall. Fl. Ross.*, i. t. 5., *Gmel. It. Ill.*, t. 4.—Branches not spiny. Fruit date-shaped, eatable; almost as large as that of a jujube, and used in the dessert in Persia, where it is called zinzeyd. The flowers are more fragrant than those of *E.* h. angustifòlia. (*Lindl.* in *Bot. Reg.*, t. 1156., and in *Nat. Syst. Bot.*, p. 194.) There are plants of this variety in the Horticultural Society's Garden, and there is one in the Chelsea Botanic Garden.

¶ E. *h.* 4 *spinòsa*; *E.* spinòsa *L.* — Branches spiny. Leaves lanceolate. Fruit insipid.

■ 2. *E.* ARGE'NTEA *Ph.* The silvery-*leaved* Elæagnus, *or Wild Olive Tree.*

Identification. Pursh Fl. Amer. Sept., 1. p. 114.; Nutt. Gen. Amer., 1. p. 97.; Lodd. Cat., ed. 1836.
Synonyme. Missouri Silver Tree, *U. S. of N. Amer.*
Engraving. Our *fig.* 1204.

Spec. Char., &c. A shrub, from 8 ft. to 12 ft. high, not spiny. Leaves waved, oval-oblong, rather acute, glabrous on both surfaces, and covered with silvery scales. Flowers aggregate, nodding. Sexes apparently diœcious. Fruit roundish-ovate, of about the size of a small cherry, cartilaginous, covered with silvery scales, having 8 grooves; the flesh dry, farinaceous, eatable; the nucule subcylindric, its exterior part consisting of a tenacious woolly integument. A native of Hudson's Bay, and found on the



1204

argillaceous broken banks of the Missouri, near Fort Mandan; flowering in July and August. (*Nutt.*) It was introduced in 1813. There are plants in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges. According to Pursh, Shephérdia argéntea *Nutt.* resembles the *Elæágnus* argéntea *Pursh* so much, without the fruit, that, in this state, one might easily be mistaken for the other. In the Garden of the London Horticultural Society, the shrub or low tree bearing this name is very distinct from any species of *Elæágnus*; but it differs from the species of that genus, in having opposite leaves and branches. Whether it is the plant meant to be described by Pursh, we are unable to determine; it is certainly not the *E.* argéntea figured in Watson's *Dendrologia*, which appears to be *E.* orientàlis, the flowers being produced on the current year's wood. The plant which is in the Horticultural Society's Garden, and which may be considered provisionally as *E.* argéntea, is one of very great neatness and beauty; and well deserving

a place in every collection, especially when trained as in our figure, so as to resemble a small tree. The plant appears nearly allied to Shephérdia canadénsis, and we have no doubt it will ultimately be referred to that genus. Possibly, indeed, it may be only a modification of S. canadénsis; for it is not more different from it than the woolly-leaved varieties of the common pear in a wild state, such as *Pýrus commùnis salicifòlia*, are from the green-leaved varieties, such, for example, as those which are found indigenous in most parts of England, or are grown for stocks in British nurseries.

App. i. *Half-hardy Species of* Elæágnus.

1205



■ E. *conférta* Roxburgh, Burm. Zeyl., t. 39. f. 1., according to Don's Prod. Fl. Nep., the grouped-flowered elæagnus, is a large, branched shrub, and, according to Roxburgh, a climbing one. Leaves oval-oblong, acuminate, 3—4 in. long, 1½—2 in. broad, silvery beneath. Fruit oblong, succulent, eatable. A native of Nepal, where it flowers in November, and where the fruit is eaten by the inhabitants. (*Don's Prod. Fl. Nep.; Lindl. Nat. Syst. of Bot.*) This species is stated to have been introduced in 1825; but we have not seen it.

♀ E. *arbòrea* Roxb., Don Prod. Fl. Nep., p. 67., is a large tree, with spiny branchlets, and oval-oblong leaves, a native of Nepal, at Nahrinbetty, where it flowers in November, and produces an edible fruit. It was introduced in 1819.

■ E. *latifòlia* L., Bur. Zey., 39. t. 2., is a native of the East Indies, where it forms an evergreen shrub, 4 ft. or 5 ft. high. There are plants at Messrs. Loddiges, which are preserved through the winter in cold-pits; whence we infer that, like the preceding sorts, it would stand against a conservative wall.

■ E. *salicifòlia*? D. Don, (*fig.* 1205) is a species apparently very distinct, and tolerably hardy, of which we have only seen one plant about 3 ft. high, in the arboretum at Kew. It promises to be a most valuable addition to our nearly hardy shrubs. It bears in foliage a close resemblance to Shephérdia canadénsis.

Genus II.



HIPPO'PHAE L. The Hippophae, *Sea Buckthorn, or Sallowthorn.* *Lin. Syst.* Diœ'cia Tetrándria.

Identification. Lin. Gen., 517., in part: the H. canadénsis *L.* is now included in the genus Shephérdia Nutt.

Synonymes. Rhamnöides *Tourn. Cor.* 53.; Argoussier, *Fr.*; Haffdorn, or Sanddorn, *Ger.*; Espino amarillo, *Span.*

Derivation. *Hippophaes*, or *Hippophues*, was the name of a shrub mentioned by Theophrastus and Dioscorides; and which is supposed to be the same as the hippophyes of Pliny. The derivation is supposed to be from *hippos*, a horse, and *phaō*, to brighten; and, as according to the *Nouveau Du Hamel* the plant was employed by the Greeks as a medicine for horses, it may have been given to them to make their coats sleek and shining, and have thus procured its name.

Description, &c. Large shrubs or trees; natives of Europe and Asia; ornamental in British gardens, on account of their grey silky foliage, and of their berries.

♀ ■ 1. *H.* Rhamnöi'des *L.* The Buckthorn-like Hippophae, *Sea Buckthorn, or Sallowthorn.*

Identification. Lin. Sp. Pl., 1452.; Smith Engl. Flora, 4. p. 238.; Eng. Bot., t. 425.

Synonymes. Rhamnöides floriféra sálicis fòlio *Tourn. Cor.*, 53.; Rhamnöides fructífera *Raii Syn.* 445.; Argoussier faux Nerprun, *Fr.*; Weidenblättriger Sanddorn, *Ger.*; in the Alps of Switzerland it is called Arve, or Saule épineux.

Engravings. Eng. Bot., t. 425.; Fl. Dan., t. 265.; N. Du Ham., 6. t. 80.; Pall. Fl. Ross., 1. t. 68.; and our *fig.* 1206.

Spec. Char., &c. Branches each ending in a spine. Leaves linear-lanceolate, mostly bluntish, dark green, and minutely dotted, not scaly on the upper side; silvery as well as scaly on the under one. (*Smith.*) A low tree, or large shrub; a native of many parts of Europe, on sandy sea coasts. Found in England, in various places on the east and south-east coast, but not in Scotland; flowering in May, and producing bright orange-coloured berries,

which are ripe in September, and remain on the tree as long as the leaves, and freqnently till the following spring.

Statistics. In the environs of London, the largest trees are those at Syon, one of which is 33 ft. high, with a trunk 11 in. in diameter, and a fine round head 17 ft. in diameter. At Kew, a male plant, near the palace, is 25 ft. high. In Oxfordshire, at Oxford, in the Botanic Garden, 10 years planted, it is 15 ft. high. In Rutlandshire, at Belvoir Castle, 18 years planted, it is 15 ft. high. In Suffolk, at Ampton Hall, 12 years planted, it is 12 ft. high. In Yorkshire, in the Hull Botanic Garden, 10 years planted, it is 12 ft. high. In Scotland, in Banffshire, at Huntley Lodge, 12 years planted, it is 20 ft high. In Argyllshire, at Toward Castle, 13 years planted, it is 14 ft. high. In Sutherlandshire, at Dunrobin Castle, 13 years planted, it is 5 ft. high. In Ireland, in the Glasnevin Botanic Garden, Dublin, 30 years planted, it is 12 ft. high; at Cypress Grove, Dublin, it is 15 ft. high. In the King's County, at Charleville Forest, 10 years planted, it is 15 ft. high. In Galway, at Coole, it is 28 ft. high. In Louth, at Oriel Temple, 25 years planted, it is 19 ft. high. In Sligo, at Makree Castle, 10 years planted, it is 5 ft. high. In France, near Paris, at Sceaux, 10 years planted, it is 15 ft. high; in the Botanic Garden at Avranches, 10 years planted, it is 16 ft. high. In Germany, in Hanover, at Harbke, 6 years planted, it is 5 ft. high. In Saxony, at Worlitz, 46 years planted, it is 20 ft. high. In Bavaria, at Munich, in the Botanic Garden, 24 years planted, it is 18 ft. high. In Austria, near Vienna, at Brück on the Leytha, 40 years planted, it is 16 ft. high. In Prussia, near Berlin, at Sans Souci, 20 years planted, it is 16 ft. high. In Sweden, at Stockholm, in the Government Garden, 15 years planted, it is 7 ft. high. In Russia, in the Crimea, where, according to Descemet, it is employed, as in some parts of France, to fix drifting sands, and protect the seeds of *Pinus Pináster*, which are sown on them, it grows with great vigour. In Italy, at Monza, near Milan, 21 years planted, it is 12 ft. high.

Varieties.

- ✝ ▲ H. *R.* 2 *angustifôlia* Lodd. Cat., ed. 1836; see the plate of this tree in our last Volume, which is a portrait of a tree, of the female sex, in Messrs. Loddiges's arboretum, taken in October, 1834. Its leaves are obviously more narrow than those of the species; the young branches are pendulous; and the tree is highly ornamental. There are plants, both of the male and of the female of this variety, in the Horticultural Society's Garden, and in the collection of Messrs. Loddiges.
- ✝ ▲ H. *R.* 3 *sibírica*, *H.* sibírica *Lodd. Cat.*, ed. 1836, appears to differ very little, if at all, from the species; but, the plant not being in a healthy state, it may be more distinct than we suppose it to be. A male plant of *H.* Rhamnöìdes in the London Horticultural Society's arboretum, which flowered in 1835, had its flower buds smaller and earlier in blossom than those of the other; and this, perhaps, may be *H.* R. sibírica; the plants of species which are common to Siberia, and the west of Europe, always flowering earlier in this country than plants of the same species which are indigenous to it, or to Central Europe generally.

Description, &c. In its wild state, the sea buckthorn, sallowthorn, or willowthorn, rises, with ligneous stems, to the height of 8 ft. or 10 ft.; but, in a state of culture, and when trained to a single stem, it grows twice or thrice that height. Its branches are numerous, irregular, and covered with a brown bark. The flowers are small, solitary, and appear before the leaves, or coeval with them. The berries are produced on the female plant in great abundance, when the male plant stands near it, but not otherwise. There is said to be a variety with red berries which Miller saw on the sand-banks in Holland; but we have not heard of its being in cultivation. The species is found wild in England, upon cliffs above the level of the sea, from Kent to Yorkshire; and is plentiful between Yarmouth and Cromer, on the flat sandy coast. In Russia, it is found in low, wet, and sandy situations, more particularly in the subalpine districts about Caucasus; and it is abundant throughout great part of Tartary. "*H*ippóphae Rhamnöìdes grows in profusion all along the course of the



1206

Arve; and Deiléphila (*Sphínx*) hippóphaes is now so plentiful, in consequence of the numbers of it collected and bred by the peasants, that a specimen costs

but 3 francs; specimens were formerly sold at 60 francs each, and one of those first discovered was sold for 200 francs." (*Spence* in *Mag. Nat. Hist.*, vol. iv., for 1830, p. 148.) A shrub so common throughout Europe and Asia could not escape being known to the Greeks and Romans; but to what use they applied it is uncertain. In modern times, its leaves form the food of sheep, in poor maritime pastures, where the sheep sometimes also eat the berries. In Dauphiny, a decoction is made of these berries, which is used for the same purpose as that made from the berries of the *S*olànum Dulcamàra, in Wales; viz., to remove cutaneous eruptions. According to Pallas, the berries of the sea buckthorn are gratefully acid, and are much eaten by the Tartars, who make a jelly or preserve of them, and serve them up with milk or cheese, as great dainties. The fishermen of the Gulf of Bothnia prepare a rob, or jam, from them, which imparts a grateful flavour to fresh fish; and a kind of sauce is also made from them in the south of France. In some parts of France and Switzerland they are considered poisonous. J. J. Rousseau, in his *Rêverie du Promeneur Solitaire*, vii. Promenade, relates a curious story respecting his having made a botanical excursion in the neighbourhood of Grenoble, with a local botanist, who, though he saw him eating the fruit, which he knew, or believed to be, poisonous, was so polite, or regarded Rousseau with so much respect, that he durst not presume to warn him of his danger. In Britain, and on the Continent, the sea buckthorn is sometimes planted as hedges; and, as it endures the sea breeze, and throws up suckers freely from the roots, it is a useful plant for fixing drift sands, along with the grasses Psámma, *E*'lymus, *C*àrex, &c., and also for producing woody scenery in marine situations, where few other trees or shrubs will grow. In pleasure-grounds, when trained to a single stem, it forms a small, durable, and very interesting tree, from the dull pewter-like tinge of its foliage in summer, and the fine effect of its berries in autumn; but it must be recollected that the berries will not be produced unless both sexes are planted contiguously. As the flowers, especially those of the male plants, come out very early in the season, their buds, which are in spikes, have a conspicuous appearance during winter, and contrast finely with the fruit on the female plants, which remains on through the winter, after the leaves drop off, unless it is eaten by birds. In British nurseries, plants are commonly increased by suckers, which are produced in abundance; and a deep sandy soil is suitable for growing the plant to a large size. It may be planted in elevated and exposed situations and on the sea coast, where few other trees will grow.



1207

⸸ ■ 2. *H.* SALICIFO'LIA *D. Don.* The Willow-leaved Hippophae, *Sea Buckthorn, or Sallowthorn.*

Identification. Don Prod. Fl. Nep., p. 68.; Lodd Cat., ed. 1836.
Synonyme. *H.* conférta *Wall.* in *MSS.* of the *Catalogue of the Linnæan Society's Indian Herbarium*, *Royle's Illust.*, p. 323.
Engraving. Our *fig.* 1207.

Spec. Char., *&c.* Without thorns, upright, branched. Leaves lanceolate, obtuse, whitely tomentose, as are the branchlets. A native of Sirinagur, in Nepal, whence it was introduced in 1822. Judging from the plants in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges, it appears to be a much more robust species than *H.* Rhamnöìdes, though probably more liable to be injured by

frost. The shoots produced in one season, from a plant cut down, are 5 ft. or 6 ft. in length, and the leaves about twice the length of those of the common species, much less silvery, and so closely resembling those of *Sàlix viminàlis*, as to make the shoots from a plant that has been cut down liable to be mistaken for shoots of that species at a short distance. The plant in the London Horticultural Society's Garden is of the female sex, and flowered in 1835, when it was about 15 ft. high.

Statistics. In the environs of London, the largest plants are in the Horticultural Society's Garden, where they are 20 ft. high. In Surrey, at Deepdene, 9 years planted, it is 22 ft. high. In Worcestershire, at Croome, 10 years planted, it is 10 ft. high. In Scotland, in Edinburghshire, at Gosford House, 13 years planted, it is 15 ft. high. In France, in the neighbourhood of Paris, it is upwards of 30 ft. high.

GENUS III.

SHEPHE'RDIA Nutt. THE SHEPHERDIA. *Lin. Syst.* Dioe'cia Octándria.

Identification. Nutt. Gen. Amer., 2. p. 240.
Synonyme. *Hippóphae L.*, as to the species S. canadénsis *Nutt.*
Derivation. Named by Nuttall, in honour of the late Mr. *John Shepherd*, curator of the Botanic Garden of Liverpool, a scientific horticulturist, to whose exertions, and the patronage of the celebrated Roscoe, that institution owes its present eminence.

Description, &c. Small spinescent trees, with the aspect of *Elæágnus*. Leaves entire, covered with silvery scales. Flowers small, laterally aggregate. Berries diaphanous, scarlet, acid. (*Nutt.*) Culture, in British gardens, as in *Hippóphae*.

1. S. ARGE'NTEA *Nutt.* The silvery-*leaved* Shepherdia.

Identification. Nutt. Gen. Amer., 2. p. 240.
Synonymes. *Hippóphae argéntea Pursh Fl. Amer. Sept.*, 1. p. 115.; Missouri Silver Leaf, and Buffalo Berry Tree, *Amer.*; Rabbit Berry, and Beef Suet Tree, *Amer. Indians*; Graise de Buffle, or Buffalo Fat, *French Traders.*
Engravings. Our *fig.* 1208.



1208

Spec. Char., &c. Leaves oblong-ovate, obtuse; on both surfaces glabrous, and covered with silvery peltate scales. (*Pursh* and *Nutt.*) A small tree, from 12 ft. to 18 ft. high; a native of North America, on the banks of the Missouri, and its tributary streams, and of other places; flowering in April and May. It was introduced in 1818, and is not uncommon in collections. The plant in the Horticultural Society's Garden, in 1835, was 7 ft. high, though crowded among other shrubs. It forms a very elegant small tree, particularly well adapted for suburban gardens. In the Brighton Nursery, near Boston, in North America, there is a standard tree which, in 1831, was 14 ft. high, though only 8 years old, from the seed. The tree is perfectly hardy in every part of America, where it is one of the earliest-flowering trees, producing its blossoms in March. "Its fruit is about the size of the red Antwerp currant, much richer to the taste, and forms one continued cluster on every branch and twig." (*Gard. Mag.*, vii. p. 571.) The largest plant in the neighbourhood of London is in the Twickenham Botanic Garden, where it is called *Elæágnus argéntea*, and in 1836 it was 5 ft. high. It flowers freely every year. Price of plants, in the London nurseries, 2*s.* 6*d.* each.

2. S. CANADE'NSIS *Nutt.* The Canadian Shepherdia.

Identification. Nutt. Gen. Amer., 2. p. 241.
Synonyme. *Hippóphae canadénsis Lin. Sp. Pl.*, 1453., *Mill. Dict.*, No. 2., *Willd. Sp. Pl.*, 4. p. 744., *Pursh Fl. Amer. Sept.*, 1. p. 119.
Engravings. Encyc. of Plants, No. 13878.; and our *fig.* 1209.

Spec. Char., &c. Leaves ovate, or cordate-ovate, opposite; green, and nearly

glabrous upon the upper surface; upon the under one stellately pilose, silvery, and scaly; the scales rusty, deciduous. Branches opposite. Flowers disposed in upright racemes between the first leaves, and of half the length of these. (*Nutt.*, *Willd.*, and obs.) A deciduous shrub, a native of North America, on the borders of lakes, in the western parts of the state of New York, in Canada, and along the St. Lawrence to its source, where it grows to the height of 6 ft. or 8 ft. It has been in cultivation, in British gardens, since 1759, but is not frequent in collections. The fruit is sweetish, but scarcely eatable. A plant of this species, in the Cambridge Botanic Garden, is a thinly branched shrub, about 5 ft. high, and not striking in its general aspect; the plant in the Hackney arboretum is about the same height; one in the arboretum at Kew is only 3 ft. high. One in the Twickenham Botanic Garden is 4 ft. high.

1209



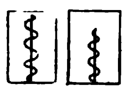
CHAP. XCVIII.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS OF THE ORDER ARISTOLOCHIA'CEÆ.

Those of which we shall treat are included in the genus *Aristolòchia L.*, which has the following characters: —

Aristolo'chia L. Calyx of some other colour than green, and in colour and texture resembling a corolla; in its lowest part connate with the ovary; inflated above this part, then tubular, and ending in an expanded border, which has 3 segments, and these are valvate in æstivation. Stamens 6, adhering to the style and stigmas. Style 1. Stigmas 6, radiating. Capsule with 6 cells and numerous seeds. Embryo very minute, placed in the base of fleshy albumen. Habit of growth, in most, twining. Wood without concentric zones. Leaves alternate, undivided in most. Calyx, which is the obvious part of the flower, yellow, brown, dark brown, and, in some, spotted on a yellow ground. (*Lindley, Nat. Syst. of Bot.*; *Willd. Sp. Pl.*; and observation.) Twining shrubs. The hardy species natives of North America, and the half-hardy of Africa and the Levant. "The most remarkable species of the genus *Aristolòchia* are those which, in many of the tropical parts of America, excite the wonder of travellers, by the gigantic size or grotesque appearance of the flowers; such as *A.* cymbífera, the border of the calyx of which resembles one of the lappets of a Norman woman's cap, and measures 7 in. or 8 in. in length;" (see *Bot. Reg.*, vol. xviii. t. 1543.) and *A.* cordiflòra and *A.* gigantèa, the flowers of which are from 15 in. to 16 in. across, and are large enough to form bonnets for the Indian children." (*Penny Cyc.*, vol. ii. p. 328.)

Genus II.



ARISTOLO'CHIA L. The Birthwort. *Lin. Syst.* Gynándria Hexándria.

Identification. Schreb. Lin. Gen., No. 1383.; Willd. Sp. Pl., 4. p. 151.
Synonymes. Aristoloche, Fr.; Osterluzey, Ger.
Derivation. Aristolòchia was the name of a plant mentioned by Dioscorides, and considered as of sovereign use in the disorders incident to childbirth: it is derived from *ariston*, best, and *lochia*, parturition.

⚘ 1. *A.* SI'PHO *L'Hérit.* The Siphon-*like, or tube-flowered,* Birthwort.

Identification. Ait. Hort. Kew., 3. p. 311.; L'Hérit. Stirp. Nov., 13. t. 7.; Michx. Fl. Bor. Amer., 2. p. 161.; Willd. Sp. Pl., 4. p. 155.; Lodd. Cat., ed. 1836.
Synonymes. *A.* macrophylla *Lam. Encycl.*, 1. p. 252.; Aristoloche Syphon, *Fr.*; grossblättrige Osterluzey, *Ger.*; Pipe Vine, or Birthwort, *Amer.*
Engravings. L'Hérit. Stirp. Nov., t. 7.; N. Du Ham., 4. t. 10.; Bot. Mag., t. 534.; and our *fig.* 1210.

Spec. Char., &c. Stem twining. Leaves cordate, acute. Bractea of the peduncle ovate. Corolla ascending; its limb in 3 equal portions, not expanding flat, brown. (*Willd.*) A deciduous twining shrub; a native of North America, on the Alleghany Mountains, from Pennsylvania to Carolina; producing its yellowish brown flowers in May and June. It was introduced in 1763, and is frequent in gardens, where it forms a tall twining shrub, flowering abundantly. In favourable situations it reaches to a considerable height: a plant in the Cambridge Botanic Garden, after reaching the top of the wall it was planted against, ascended a tree in the next garden; in all 20 ft. The appearance of the magnificent leaves of this species is striking. In its native country, it climbs and twines to the summits of the very highest trees; flowering early in summer, and ripening its seeds in autumn, though but sparingly. This species is remarkable for the form of its flower, which is bent like a siphon; for the trifid border of its corolla; for the very large bractea placed on the middle of the peduncle; and for the disposition of the seeds, and the aril common to all the seeds of each cell. The roots are woody, and have the smell of camphor. The stems, branches, and twigs are also strongly scented, as are the flowers. In British gardens, this species, to grow freely, requires a deep free soil, dry rather than moist, and a warm situation. It is propagated by division of the root, by suckers, or by seeds, which are sometimes received from North America. Price of plants, in the London nurseries, 1*s.* 6*d.* each; at Bollwyller, 2 francs; and at New York, 50 cents.



1210

⚘ 2. *A.* TOMENTO'SA *Sims.* The tomentose Birthwort.

Identification. Sims in Bot. Mag., t. 1369.; Lodd. Cat., ed. 1836.
Engravings. Bot. Mag., t. 1369.; Bot. Cab., t. 641.; and our *fig.* 1211.

Spec. Char., &c. Stem twining. Leaves cordate, downy beneath. Peduncle solitary, without a bractea. Corolla with its tube twisted back, and much more deeply divided than in *A.* sipho, expanding flat, and yellow, with the mouth of the tube of a deep purple. (*Encyc. of Pl.*) A native of North America; introduced in 1799. There is a plant in the Chelsea Botanic Garden, which is 12 ft. high; but we are not without considerable doubts as to its being any thing more than a variety of *A.* sipho. Being tolerably distinct, however, it merits a place in collections.



1211

App. i. *Half-hardy Species of* Aristolòchia.

A. *sempervirens* L., Bot. Mag., t. 1116., Bot. Cab., t. 231., is a native of Candia; introduced in 1727, and produces its flowers in May and June. In green-houses, it is seldom seen more than 4 ft. or 5 ft. in height; but, against a conservative wall, it would probably grow much higher.

A. *glauca* Desf., Bot. Mag., t. 1115., Lodd. Cat., ed. 1836, is a native of Barbary; introduced in 1785. It is evergreen, like the preceding sort.

A. *altissima* Desf., A. *caudàta* Desf., and A. *trilobàta* Willd., are described in the *Nouv. Du Hamel* as growing in French gardens, with protection during winter. *A.* trilobàta *Bot. Reg.*, t. 1399., is a native of South America, where it grows to the height of 6 ft. or 7 ft. There is a species of *Aristolòchia*, a native of China, against a wall in the Horticultural Society's Garden, which is not yet named. It has stood there four years, and appears quite hardy.

CHAP. XCIX.

OF THE HARDY AND HALF-HARDY LIGNEOUS PLANTS OF THE ORDER *EUPHORBIA'CEÆ*.

THE hardy species belonging to this order are included in 3 genera, namely *E*uphórb*ia* L., Stillíng*ia* Garden, and *B*úxus *Tourn.*; and these have the following characters: —

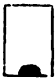
*E*UPHO'RB*IA* L. What seem flowers, and were formerly deemed flowers, are now regarded as each an inflorescence. This consists of an involucre, within which flowers of both sexes are associated, many male flowers around a solitary central female one. Involucre of one leaf, bell-shaped or top-shaped, with a limb in 8—10 segments, the outer coloured and resembling petals. — Male flower. This consists of a stamen, articulated upon a supporting column that is attended, (?) at its base, by, mostly minute, chaffy scales. — Female flower. Pistil solitary, central, upon a long pedicel, and becoming protruded. Ovary roundish, of 3 cells, each containing 1 ovule, affixed to the angle next the centre of the ovary. Styles 3, connate at the base, each ending in a bifid stigma. Fruit a regma. (*Lindley's Intr. to Bot.*) Valves 3, with a partition from the centre of each, by which they form 3 cells. Seeds 1 in a cell; cells bursting elastically.—Sap, in all, milky, resinous; and, in most, acrid. Leaves, in most, alternate. Inflorescences disposed in umbels or panicles. (*T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.*; *Smith, Eng. Fl.*; and observation.)

STILLI'NG*IA* Garden. Flowers unisexual. Males in a spike; females at the base of the same spike: (?) the two kinds, in S. *l*igústrina, upon distinct plants. — Male. Seven flowers together, within an entire involucre; or, in S. *l*igústrina, with the flowers not involucrated, but solitary in the axil of a bractea. Calyx like a corolla, of 1 piece, funnel-shaped, its margin jagged; in S. *l*igústrina the calyx is 3-cleft, and rather flat. Stamens 2-3; in S. *l*igústrina, prominent, the filaments very slightly connected at the base. — Female. Involucre 1-flowered; otherwise as in the male. Calyx superior, shaped as in the male. Ovary roundish. Style thread-shaped. Stigmas 3. Fruit a regma (*Lindley's Intr. to Bot.*), surrounded at the base by the involucre a little enlarged, somewhat turbinate, bluntly triangular, 3-lobed, 3-celled, 1-seed in each cell.—Sap milky. Leaves alternate, stipuled, entire. Spikes of flowers solitary or dichotomous, terminal or lateral. (*Smith* in *Rees's Cyclop.*; and *Nutt.* in his *Gen. Amer.*)

*B*U'XUS *Tourn.* Flowers in axillary groups; unisexual in effect, but the male flowers have a rudiment of a pistil; those of both sexes borne on one plant. — Male. Calyx of 4 minute leaves. Stamens 4, inserted under the rudiment of a pistil. — Female. Flowers singly, at the tip of groups of male ones. Calyx as in the male. Ovary sessile, roundish, of 3 cells, and 2 ovules in each cell. Styles 3. Stigmas 3. Fruit a regma, leathery, beaked with the styles; consisting of 3 incomplete cells that open down the centre and divide the style, and of 3 valves that bear the incomplete dissepiments in their centres. Seeds 2 in a cell, pendulous, both enclosed in the endocarpial lining of the cell; and this endocarpial lining, after the seed is ripe, disparts elastically, to admit of, and conduce to, their dispersion. (*T. Nees ab Esenbeck's Gen. Pl. Fl. Ger.*)—Evergreen shrubs, or small trees, with rigid,

smooth, stalked, opposite, entire leaves. Flowers aggregate, from axillary buds, whitish. Fruit green. (*Smith Eng. Fl.*, iv. p. 132.)

Genus I.



EUPHO'RBIA L. The Euphorbia, *or* Spurge. *Lin. Syst.* Monœ'cia Monándria.

Identification. Lin. Gen., 943.; Lam. Ill., t. 411.; Smith Eng. Fl., 4. p. 58.
Synonymes. Tithymalus *Tourn. Inst.*, t. 18., *Gærtn. Fruct.*, t. 107.; Euphorbe, *Fr.*; Wolfsmilch, *Ger.*
Derivation. From *Euphorbus*, physician to Juba, king of Mauritania, who is said first to have used some of the plants of this genus in medicine.

Description, &c. This genus consists of milky plants, most of which are herbaceous, but two or three of which are rather woody. The flowers of the hardy kinds are generally of a greenish colour, which renders them inconspicuous; and they have all an extremely acrid juice, which has the appearance of milk. This juice was formerly considered medicinal, and is still used occasionally to destroy warts, or for raising slight blisters. The plants are propagated by division. The only two worth cultivating, as shrubby, appear to us to be the *E. Characias L.* and *E. spinòsa L.*



1212



⊥

E. *Characias* L., Mart. Mill., No. 95., Smith Eng. Fl., iv. p. 68., Eng. Bot., t. 442.; *E.* aléppica of some gardens; and our *fig.* 1212. — An upright, bushy, leafy plant, green in its foliage, and purplish brown in the bark of its shoots, which are mostly unbranched. The flowers are in stalked panicles a few in each panicle, and the panicles are disposed racemosely along the upper portions of the shoots. The more obviously coloured part of the inflorescence is of a dark purple. The scent of the flowers is powerfully fetid and disagreeable. The plant, in a sheltered nook, under a wall, will attain to the height of 3 ft. or more (in Martyn's *Miller*, 5 ft. or 6 ft.); and is interesting, even when not in flower, from its being evergreen, and from the character of its foliage; the leaves being lanceolate, acute, entire, downy, dark green, and spreading every way. (*Smith Eng. Fl.*, and observation.) It is indigenous in France, Spain, and Italy, according to *Willd. Sp. Pl.*; and, according to Mr. Whately, as quoted in *Eng. Fl.*, it is very plentiful in the Forest of Needwood, Staffordshire, and undoubtedly wild there. A plant which we have had in our garden, at Bayswater, since 1828, was found wild by us, in the July of that year, in a wood belonging to John Perry, Esq., at Stroud House, near Hazlemere. It forms a dense evergreen bush, admirably adapted for rockwork; its fine, dark, bluish green, shining leaves, with which the shoots are densely clothed, render it highly ornamental at every season of the year; and its flowers, which appear in February, continue on the plant through the spring and part of the following summer.

E. *spinòsa* L., Wats. Dend. Brit., t. 45, and our *fig.* 1209. — A leafy, shrubby plant; a native of the south of Europe; generally kept in green-houses in Britain, where it assumes the character of an erect shrub, about 2 ft. high, with a decidedly ligneous stem. The tips of the branches become dry with age, and as, though withered, they continue on the plant, they have the appearance of spines. It was cultivated by Miller, in 1752, but is rare in British collections. In the open air, in the Botanic Garden at Cambridge, it is a recumbent shrub. It is not easily propagated by cuttings made in the common way, but is said to grow readily from cuttings of the roots.



1213

App. i. *Half-hardy Species of* Euphórbia.



1214

E. *dendröides* L. is a native of Italy, Crete, and of the Island of Hieres, near Toulon, where it forms a small branched shrub, about 4 ft. high. *E. Charàcias* and *E.* dendröides, according to Dr. Philippi, grow in the streams of decayed lava on Etna. *E.* dendröides, he adds, "is one of the finest shrubs in Sicily, and rises to a height of about 6 ft., the stem forking soon above the ground, and each branch divided again, so that the form of the whole is perfectly semiglobular. In summer it is quite bare of foliage, when the numerous, smooth, verticillate branches give the plant a most singular appearance; but with the rains of autumn the numerous linear leaves begin to sprout forth at the end of the boughs, and a corymb of yellow flowers tips the extremity of each in February." (*Comp. to the Bot. Mag.*, i. 51.)

E. *mellifera* Ait., Bot. Mag., t. 1305., and our *fig.* 1214., is a handsome free-growing shrub, a native of Madeira. A plant stood out in the Trinity College Botanic Garden, at Dublin, from 1821 to 1831, forming a bush about 4½ ft. high, and 5 ft. in diameter, flowering all the winter. It was cut down by the severe frost of the spring of 1831, but sprang up again; and it is now (Sept. 1836), Mr. Mackay informs us, nearly 5 ft. in height, and 5 ft. in diameter. *E. Charàcias*, in the same garden, rarely exceeds 2½ ft. in height.

Other species, natives of the Levant, the Canaries, Portugal, and North and South America, may possibly be found as hardy as *E.* mellifera. In the *Vues Phytostatiques* of Webb and Bertholet's *Histoire Naturelle des Iles Canaries*, the *E.* canariénsis and *E.* piscatòria are represented in pl 2. as the prevailing species; the latter forming handsome trees, from 10 ft. to 15 ft. high, with straight, erect stems

Genus II.

STILLI'NG*IA* Garden. The Stillingia. *Lin. Syst.* Monœ'cia Monadélphia.

Identification. "Stillingia was sent under that name to Linnæus by the celebrated Dr. Alexander Garden." (*Smith* in *Rees's Cyclop.*) Lin. Mant., 19.; Schreb. Lin. Gen., 658.; Smith in Rees's Cyclop.; Mart. Mill. Dict.

Derivation. Named by Dr. Alexander Garden in honour of Mr. *Benjamin Stillingfleet*, author of a work entitled *Miscellaneous Tracts relating to Natural History*, &c., partly translated from the writings of Linnæus.

Description, &c. The only hardy species is a deciduous shrub; a native of North America.

1. S. ligu'strina *Willd.* The Privet-*leaved* Stillingia.

Identification. Willd. Sp. Pl., 4. p. 588.; Pursh Fl. Amer. Sept., 2. p. 608.

Spec. Char., &c. Shrubby. Leaf consisting of a petiole and a disk that is oval-lanceolate, pointed at both ends, and entire. Male flowers upon very short pedicels. (*Michx. Fl. Bor. Amer.*, ii. p. 213.) Nuttall has questioned whether the sexes are not diœcious, and has noted the female flowers as "not seen," but the male ones as being disposed in spikes, part lateral, part terminal, and as having a 3-cleft, rather flat, calyx, and 3 stamens that have kidney-shaped anthers; and the bracteas as 1–2-glanded and 1-flowered. (*Nutt. Gen. Amer.*) A deciduous shrub, growing about 4 ft. high; a native of North America, in shady woods, in Carolina and Georgia; flowering in June and July. It was introduced in 1812, and plants were in the collection of Messrs. Loddiges in 1830. From these gentlemen we received a plant in that year, but it is since dead; as is also a plant of this species in the Hackney arboretum; we are not aware that the species is now in existence, in a living state, in England.

Genus III.

BU'XUS *Tourn.* The Box Tree. *Lin. Syst.* Monœ'cia Tetrándria.

Identification. Tourn. Inst., t. 345.; Lin. Gen., 486.; Smith Eng. Flora, 4. p. 132.; Theodor Nees ab Esenbeck Gen. Plant. Floræ Germanicæ, fasc. 3. t. 16.

Synonymes. Buis, *Fr.*; Buxbaum, Buchsbaum, *Ger.*

Derivation. From *pyxos*, dense; in reference to the hardness and closeness of the wood; or, perhaps, to the denseness of the foliage. The Greeks called the boxes made of this wood, which were highly esteemed for their durability, *pyxides*; and hence, probably, arose the word *pyx*, which is used for the chest containing the Host in the Roman Catholic church.

Description, &c. Low evergreen trees or shrubs, with shining coriaceous leaves, and greenish yellow flowers; natives of Europe, and the temperate parts of Asia; of easy culture in any soil that is tolerably dry; and propagated freely by cuttings, or by seeds.

1. *B.* SEMPERVI'RENS *L.* The evergreen, *or common*, Box Tree.

Identification. Lin. Sp. Pl., 1394.; Smith Eng. Flora, 4. p. 133.; Baxt. Brit. Flow. Pl., 2. t. 142.
Synonymes. Búxus *Raii Syn.*, 445., *Ger. Emac.*, 1410. f., and other authors; Buis commun, Bois béni, *Fr.*; Buchsbaum, *Ger.*; Busso, Bossolo, Mortel, *Ital.*
Engraving. Eng. Bot., t. 1341.

Spec. Char., &c. Disk of leaf ovate, convex; footstalk slightly downy at the edges. Anthers ovate-arrow-shaped. (*Smith's Eng. Fl.*, iv. p. 133.) A low evergreen tree, a native of many parts of Europe, and, according to some, including Britain; growing to the height of from 15 ft. to 30 ft.; and flowering in April and May.

Varieties and Subvarieties.

B. *s.* 1 *arboréscens* Mill. Dict., No. 1.; Buis arborescent, *Fr.*; hochstaninge Buchsbaum, *Ger.* — Arborescent. Leaves ovate. (*Willd. Sp. Pl.*) This is the most common form of the species.

- B. *s. a. argéntea* Hort. — Arborescent. Leaves ovate, variegated with a silvery colour.
- B. *s. a. aúrea* Hort. — Arborescent. Leaves ovate, variegated with a golden colour.
- B. *s. a. marginàta* Hort. — Arborescent. Leaf ovate, with a margin of a golden colour.

B. *s.* 2 *angustifòlia* Mill. Dict., No. 2. — Arborescent. Leaves lanceolate. (*Willd. Sp. Pl.*)

- B. *s. a. variegàta* Hort. — Arborescent. Leaves lanceolate, variegated.

B. *s.* 3 *suffruticòsa* Mill. Dict., No. 3.; *B.* hùmilis *Dod. Pempt.*, 782.; *B. s* nàna *N. Du Ham.*, i. p. 83.; and our *fig.* 1215.; Buis nain, Buis à Bordures, Buis d'Artois, Buis de Hollande, petit Buis, *Fr.*; zwerch Buchsbaum, *Ger.* — Dwarf. Leaves small, obovate. (*Lam. Encyc. Willd. Sp. Pl.*) This is the kind usually cultivated for edging beds in gardens.



1215

B. *s.* 4 *myrtifòlia* Lam. Encyc. — Dwarf. Leaves small, oblong, narrowish. (*Lam. Encyc.*, i. p. 505.; *Willd. Sp. Pl.*) A pretty little plant; generally quite low, but, under favourable circumstances, growing to a considerable size.

Description, &c. The box is a well-known hardy evergreen tree or shrub, much esteemed in Europe, both for ornamental and useful purposes. In a wild state, it seldom exceeds the height of 12 ft. or 15 ft. in Britain; but, in Turkey and Asia Minor, trees of it have been found as high as 25 ft. The thickness of the trunk is very considerable in proportion to its height, and, in full-grown trees, varies from 6 in. to 8 in. in diameter. The bark is yellowish on the young wood, but rough and greyish on the trunk of old trees. The leaves are opposite, oval, and almost sessile: they are persistent, of a coriaceous texture, and a shining yellowish green, when they grow in a situation fully exposed to the light; but of a fine deep glossy green when shaded by other trees. The flowers are of a greenish yellow, and are disposed in little tufts in the axils of the leaves. The tree will bear the knife patiently, and is therefore, and from the closeness of its habit of growth, well adapted for clipped hedges, and all kinds of verdant architecture and statuary. "The box," says

a French writer, "has the advantage of taking any form that may be wished, under the hands of the gardener. Here it displays a niche cut in an apparently solid green bank; there, an arbour impenetrable to the rays of the sun. On one side it covers a wall with a tapestry of continual verdure, and on the other it clothes a palisade: now it divides the walks of a garden, and now it marks out the figure of a parterre. In all cases, it presents a most agreeable verdure to the eyes, and preserves the idea of cheerfulness even in winter, when almost every other tree appears mourning for the absence of the sun." (*Nouv. Cours. d'Agri.*, tom. iii. p. 276.) It grows slowly, rarely making shoots of more than 6 in. or 8 in. annually. But the tree is of great longevity; and so extremely hardy, that it is the only evergreen that will stand in the open air, without protection, in the gardens of Paris, Berlin, and Vienna.

Geography. The box is found wild throughout Europe and Asia, between 37° and 52° of N. lat., on mountains, and spreading as undergrowth among other trees, but never forming forests entirely by itself. The largest collections of wild box trees in Europe are in the Forest of Ligny in France, and in that of St. Claude on Mount Jura; but in both cases the box trees are mixed with trees of other species. Box trees are also found in forests of other trees, in several parts of France; particularly in Franche Compté, Dauphiné, Haute Provence, the chain of mountains stretching across Languedoc, and the Pyrenees. The box tree is produced abundantly in Turkey, and on the shores of the Black Sea; but a great proportion of the boxwood of commerce, sold in the European markets as Turkey box, is grown in Circassia and Georgia, whence it is brought to Odessa, and shipped for Europe. It is found in various parts of Persia, China, Cochin-China, and, according to some, in Japan. In Britain, the box is a disputed native. (See p. 25.) It grows plentifully upon Box Hill, near Dorking, in Surrey: not among deciduous trees, and shaded by them, as it does in its native habitats in France, and in other parts of the Continent; but only mixed with a few juniper bushes, that do not rise so high as itself. Ray mentions three other habitats; viz. Boxwell, in Gloucestershire; Boxley, in Kent; and the chalk hills near Dunstable: but the box tree does not appear to be now found growing in uncultivated ground any where in Britain, but on Box Hill. In Baxter's *British Flowering Plants*, vol. ii. p. 145., it is stated, on the authority of the Rev. Archdeacon Pierson, to be found in the hedges about Kilburne, near Coxwold, in Yorkshire; which, however, is no proof of its being indigenous.

History. The box tree appears to have been first mentioned by Theophrastus, who ranks the wood with that of ebony, on account of the closeness of its grain. Pliny describes it as being as hard to burn as iron, as producing no flame, and as being totally unfit for charcoal. He distinguishes three kinds, which he calls the larger, the smaller, and the Italian box; and speaks of the use of the tree for topiary work, and of the wood for musical instruments. Vitruvius also recommends the box for topiary work; and it appears to have been much employed in verdant sculpture, and close-clipped hedges, in the gardens of Roman villas in the Augustan age. Pliny describes his Tusculan villa as having a lawn adorned with figures of animals cut out in box trees, answering alternately to one another. This lawn was again surrounded by a walk enclosed with evergreen shrubs, sheared into a variety of forms. Beyond this was a place of exercise, of a circular form, ornamented in the middle with box trees, sheared, as before, into numerous different figures; and the whole fenced in by a sloping bank, covered with box, rising in steps to the top. In another part of the grounds of the same villa, the box is mentioned as being cut into a variety of shapes and letters; some expressing the name of the master, and others that of the artificer, &c. (*Plin. Epist.*, book v. letter vi.) The same practice is followed in several Roman gardens at the present day; and, in that of the Vatican, the name of the pope, the date of his election, &c., may be read from the windows of the palace in letters of box. Virgil calls it

> "Smooth-grain'd, and proper for the turner's trade,
> Which curious hands may carve, and steel with ease invade."
>
> DRYDEN'S *Virgil*.

Both Virgil and Ovid allude to the use of this wood for musical instruments, and employ the word box as if synonymous with that of flute. In more modern times, in Britain, it is mentioned by Turner, Gerard, Parkinson, and other writers on gardening and rural affairs; and, previously to the eighteenth century, was in great repute for gardens in the geometric style, from the facility with which it could be made to assume whatever form the gardener wished: it was also highly valuable when there were but few evergreens grown in England, from its hardy habit, and the liveliness of its hue. The wood of the tree has been in use for turnery from the earliest ages, and for wood engraving since the fifteenth century.

Properties and Uses. The wood of the box is remarkably heavy; weighing, when newly cut, 80 lb. 7 oz. per cubic foot, and, when perfectly dry, 68 lb. 12 oz. and 7 gr. It is the only European wood that will sink in water: it is yellow, very hard, and susceptible of a fine polish. The wood was formerly much used in England in cabinet-making and inlaying, as it still is in France; and, also, in both countries, for musical and mathematical instruments, combs, and various articles of turnery. The principal use of the boxwood, however, at present, is for wood engraving; and for this purpose it is an important article of commerce.

For Turnery, the boxwood used by the cabinet-makers and turners in France is chiefly that of the root. The town of St. Claude, near which is one of the largest natural box woods in Europe, is almost entirely inhabited by turners, who make snuff-boxes, rosary beads, forks, spoons, buttons, and numerous other articles. The wood of some roots is more beautifully marbled, or veined, than that of others; and the articles manufactured vary in price accordingly. The wood of the trunk is rarely found of sufficient size for blocks in France; and when it is, it is so dear, that the entire trunk of a tree is seldom sold at once, but a few feet are disposed of at a time, which are cut off the living tree as they are wanted. There are in the Forest of Ligny, generally, many stumps which have been treated in this manner. Boxes, &c., formed of the trunk, are easily distinguished from those made of the root, by the wood of the trunk always displaying a beautiful and very regular star, which is never the case with that of the root. Boxwood is very apt to split in drying; and, to prevent this, the French turners put the wood designed for their finest works into a dark cellar as soon as it is cut, where they keep it from three to five years, according to circumstances. At the expiration of the given time, they strike off the sap-wood with a hatchet, and place the heart-wood again in the cellar till it is wanted for the lathe. For the most delicate articles, the wood is soaked for 24 hours in fresh very clear water, and then boiled for some time. When taken out of the boiling water, it is wiped perfectly dry, and buried, till wanted for use, in sand or bran, so as to be completely excluded from the light, and air. Articles made of wood thus prepared, resemble, in appearance, what is called Tunbridge ware. The spray of the box, though it burns very slowly, is much esteemed in France, as fuel for lime-kilns, brick-kilns, ovens, &c., where a great and lasting heat is required. (*Nouv. Cours.*, &c.)

Wood Engraving. The wood used for this purpose is chiefly imported from Turkey or Odessa; and sells, in London, for from 7*l.* to 14*l.* a ton, duty included; the average annual consumption in Britain being about 582 tons. In the year 1832, M'Culloch tells us (in his *Dictionary of Commerce*), the duty on imported boxwood was 1867*l.* 17*s.* 4*d.* In France, the native trees are seldom of sufficient size for wood engraving; and wood to the amount of 10,000 francs is annually imported from Spain. The box trees which were cut down on Box Hill in 1815 produced upwards of 10,000*l.* The art of cutting on wood was invented before the art of printing; and it is supposed to have been first practised between the years 1400 and 1430. The first objects to which it was applied were very different in their character; viz. books of devotion and playing cards. The mere outlines of the figures were rudely cut in the wood with knives in the direction of the grain, and the

impressions were taken off by friction, without the aid of a press. The earliest specimen of wood engraving now extant in England is in the collection of Earl Spencer, and represents St. Christopher carrying the infant Saviour: the date is 1423. A very curious work was published between 1430 and 1450, entitled *Biblia Pauperum*, the Bible of the Poor. This work consisted of about 40 plates, illustrated by texts of scripture, all cut in wood (see *Penny Magazine*, vol. ii. p. 419.); and it is supposed to have given the first idea of the art of printing with movable types, which was invented soon after by Guttemburg. Wohlgemuth, a wood-engraver at Nuremberg in 1480, was the first who attempted to introduce shade into wood engravings; and his pupil, Albert Durer, carried the art to a very high degree of perfection; in his time the wood-cutters, or formschneiders, of Germany became so numerous as to be incorporated into a body distinct from that of the briefmahlers, letter-painters or writers. Holbein succeeded Albert Durer; but soon afterwards the art of engraving on copper having been discovered, wood engraving was comparatively neglected; and it fell into disuse till the time of Bewick, who displayed in it such extraordinary force, and delicacy of execution, as to revive a taste for the art. The first engravers on wood, and up to the time of Bewick, or nearly so, were accustomed to have the trunks of the trees on which they were to engrave sawn up into planks, and to cut out the engraving with a knife, or other tools, on the side of the grain; but, about Bewick's time, or before, the practice of cutting the trunk across into sections about 1 in. in thickness was adopted; and the engravings were cut on the wood, across the grain, with tools which will be hereafter described. The advantages of this mode are, that much finer lines can be produced; that the engraved block will give a much greater number of impressions; and that it will be far more durable. The followers of Bewick produced some beautiful engravings; but, from the mode of printing them, though they were mixed with the type, they were almost as expensive as if they had been worked, like the metal engravings, from separate plates. By the modern practice, however, woodcuts are printed from with the same ease as the movable types. The mode in which the operation of cutting on wood is still performed differs but little, according to the *Penny Magazine*, from that described and illustrated by a plate in a work called the *Book of Trades*, published at Frankfort in 1654. In this plate, the formschneider, or wood-cutter, is represented sitting "at a table, holding the block in his left hand, upon which he is cutting with a small graver in his right. Another graver, and a sort of a gouge, or chisel, lie upon the table. If we enter the work-room of a wood-engraver of the present day, we shall find the instruments by which he is surrounded nearly as few and as simple. His block rests upon a flat circular leather cushion filled with sand: and this so completely answers the purpose of holding the block firmly, and yet allowing it to be moved in every direction, that it is expressively called the wood-cutter's third hand. His cutting instruments are of three sorts: the first, which is called a graver, is a tool with a lozenge-shaped point, used for outlines and fine tints; the second, called a scauper, presents a triangular point and edges, and is used for deeper and bolder work; and the third, which is a flat tool, or chisel, is employed in cutting away those parts of the block that are to be left entirely light." (*Penny Magazine.*) The design is previously drawn upon the block with a black-lead pencil; the block, which is always cut directly across the grain, and polished so as to present a perfectly smooth surface, being previously prepared with powdered white lead mixed with a little water, to make it receive the pencil. The drawing is generally made by one artist, and the engraving executed by another. It is the business of the wood-cutter "to leave all the lines which the draughtsman has traced with his pencil; and to do this, he, of course, cuts away all the parts which form the spaces between the various lines of the drawing. The lines thus stand up, as it is called, in relief; and, when ink is applied to them by the printer, in the same way as he applies it to his metal types, they transfer the ink to the paper placed over them upon being subjected

to an adequate pressure." (*Ibid.*) Formerly, a great deal of care was required, in printing woodcuts, in "the adjustment of a number of small pieces of paper between the stretched parchment and blanket that covered the block, during the impression from the common hand-press, in order to give a greater force to the bearing upon shadows, while the lights were, of course, equally relieved from the presure;" but a mode is now discovered of lowering the lights by the wood-engraver; and the blocks are now introduced with the type, and printed from with the same facility, by the revolving cylinder of a printing-machine.

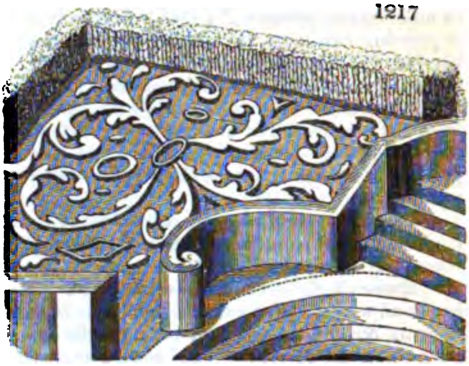
In the geometrical and architectural Style of Gardening, the box was extensively employed, both as a tree and as a shrub, throughout Europe, from the earliest times. As a tree, it formed, when clipped into shape, hedges, arcades, arbours, and, above all, figures of men and animals. As a shrub, it was used to border beds and walks, and to execute numerous curious devices; such as letters, coats of arms, &c., on the ground; but of all the uses of the dwarf box, the most important, in the ancient style of gardening, was that of forming parterres of embroidery; it being the only evergreen shrub susceptible of forming the delicate lines which that style of parterre required, and of being kept within the narrow limits of these lines for a number of years. In those days, when the flowers used in ornamenting gardens were few, the great art of the gardener was to distinguish his parterres by beautiful and curious artificial forms of evergreen plants. These forms may be described generally as belonging to that style of ornament known as the taste of Louis Quatorze. *Fig.* 1216. is a small

1216



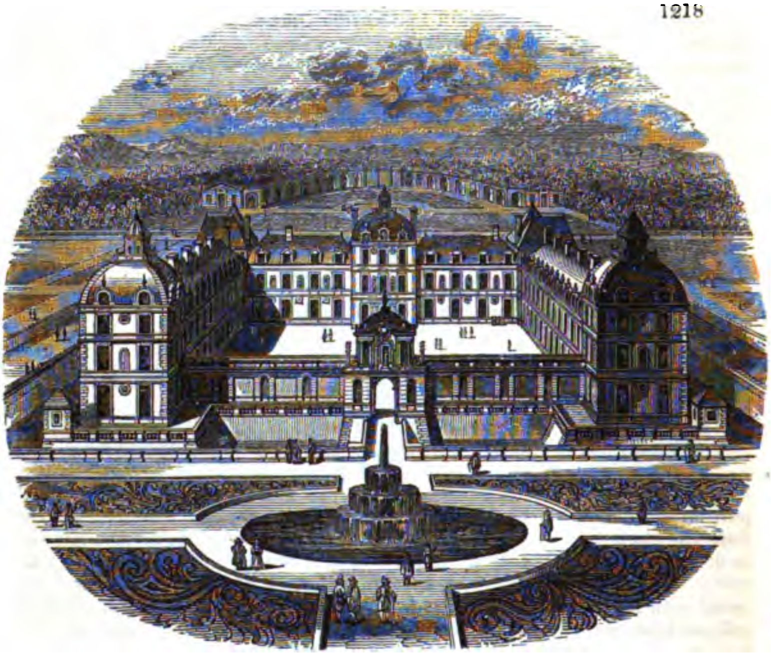
portion of the ground plan of a parterre laid out in this manner; all the lines and dark parts of the figure being formed of box, in no part allowed to grow higher than 3 in. from the ground, and the finer lines being about 2 in. wide. The space between the lines, in the more common designs, was covered with sand all of one colour; but in the more choice parterres, different coloured sands, earths, shells, powdered glass or potsherds, and other articles, were used, so as to produce red, white, and black grounds, on which the green of the box appeared to advantage at all seasons. This variety of colours gave occasion to Lord Bacon's remark: "As for the making of knots and figures with divers coloured earths, they be but toys: you may see as good sights many times in tarts." The beauty of these parterres was most conspicuous, when they were seen as a whole from the windows of the house, or from a surrounding terrace-walk. Sometimes, however, they were placed on a sloping bank, to be seen from below; an instance of which may be found in the view of the Palazzo del N. H. Venier, on the Brenta, as given in Volkamer's *Continuation der Nürembergischen Hesperidum*, published in 1714, a portion of which is represented in perspective in *fig.* 1217. In a view of

1217



"le Chasteau de Richelieu en Poictou," given in Marot's *Recueil des Plans, &c., des plusieurs de Chasteaux, Grottes*, &c., published in 1661, of which our *fig.* 1218. is a copy, a very rich parterre of embroidery may be observed in the fore-ground with a fountain in the centre; and, in the back-ground, a large semi circular space appears to be covered with the same description of ornament. It may also be observed, that there is not a single tree or shrub shown in a natural state within several hundred feet of the house, on every side. The embroidered style of parterre is still occasionally to be met with adjoin-

1218



ing very old residences in France and Italy, and even in a few places in England; and, as affording variety, it is at least as worthy of revival as the architectural style of the age in which it most extensively prevailed. The best designs in this style are to be found in the edition of Boyceau's *Jardinage*, &c., which was published in 1714, in folio. Topiary work, or the art of cutting the box and other trees into artificial forms, was carried to such an extent among the Romans, that both Pliny and Vitruvius use the word *topiarius* to express the art of the gardener; a proof that, as far as ornament was concerned, the art of clipping was considered the highest accomplishment that could be possessed by a gardener, among the ancient Romans. This

appears to have been equally the case in Europe in modern times; gardeners, even so late as the time of the Commonwealth, being called by Commenius pleachers (See *Janua Trilinguis*, Oxford edit.) About the middle of the seventeenth century, the taste for verdant sculpture was at its height in England; and, about the beginning of the eighteenth, it afforded a subject of raillery for the wits of the day, soon afterwards beginning to decline. There are some humorous papers on the subject in the *Guardian*, and other contemporary works. The following lines will give a good idea of a topiary garden:—

> "There likewise mote be seen on every side
> The shapely box, of all its branching pride
> Ungently shorne, and, with preposterous skill,
> To various beasts, and birds of sundry quill,
> Transform'd, and human shapes of monstrous size.
>
> . . . .
>
> Also other wonders of the sportive shears,
> Fair Nature mis-adorning, there were found:
> Globes, spiral columns, pyramids, and piers
> With spouting urns and budding statues crown'd;
> And horizontal dials on the ground,
> In living box, by cunning artists traced;
> And galleys trim, on no long voyage bound,
> But by their roots there ever anchor'd fast."
>
> G. West.

In modern Gardening, the tree box forms one of our most valuable evergreen shrubs or low trees. It is more particularly eligible as an undergrowth in ornamental plantations; where, partially shaded by other trees, its leaves take a deeper green, and shine more conspicuously. Next to the holly, it has the most beautiful appearance in winter; more especially when the ground is covered with snow. The variegated sorts are admissible as objects of curiosity; but, as they are apt to lose their variegation when planted in the shade, and as, in the full light, their green is frequently of a sickly yellowish hue, we do not think that they can be recommended as ornamental. The myrtle-leaved forms a very handsome small bush on a lawn. The use of the dwarf box for edgings is familiar to every one.

The other Uses of the box, in former times, were various; but most of them are now almost forgotten. The bark and leaves are bitter, and have a disagreeable smell; and a decoction of them, when taken in a large dose, is said to be purgative; and, in a small dose, sudorific. An empyreumatic oil is extracted from them, which is said to cure the toothach and some other disorders. A tincture was made from them, which was once a celebrated specific in Germany for intermittent fevers; but, the secret having been purchased and made public by Joseph I., the medicine fell into disuse. Olivier de Serres (*Théât. d'Agri.*) recommends the branches and leaves of the box, as by far the best manure for the grape; not only because it is very common in the south of France, but because there is no plant that by its decomposition affords a greater quantity of vegetable mould. The box is said to enter into the composition of various medicated oils for strengthening and increasing the growth of the hair; and Parkinson says that "the leaves and sawdust, boiled in lie, will change the hair to an auburn colour." Box is sometimes substituted for holly in the churches at Christmas; and, in a note to Wordsworth's poems, we are informed that, "in several parts of the north of England, when a funeral takes place, a basinful of sprigs of box is placed at the door of the house from which the coffin is taken up; and each person who attends the funeral takes one of these sprigs, and throws it into the grave of the deceased." (*Words. Poems*, vol. i. p. 163.) The box is the badge of the Highland clan M'Intosh; and the variegated kind, of the clan M'Pherson. (*Baxt. Brit. Fl. Pl.*, ii. t. 142.) Pliny affirms that no animal will eat the seed of the box; and it is said that its leaves are particularly poisonous to camels. It is also asserted by many authors that box trees are never cropped by cattle; and that the Corsican honey is rendered poisonous from the bees feeding on the flowers of the box.

Propagation and Culture. The box is propagated by seeds, cuttings, and layers. It seeds freely where it is allowed to grow freely; but, where it is

closely clipped in, the seeds are seldom permitted to ripen. When the seeds are to be sown, they should be gathered the moment the capsules appear ready to open, and sown immediately in light rich earth, consisting chiefly of vegetable mould, which is well drained, so that the water may never lie on the seeds.

Cuttings of from 4 in. to 6 in. in length should be put in, in autumn, in a sandy soil, and a shaded situation, and in a year they will be fit to transplant into nursery lines. Layers may be made either in the spring or autumn, and either of the young or old wood. The dwarf box used for edgings is propagated by being taken up, divided, and replanted. The roots of the box, being numerous and small, though by no means hair-like, like those of the *Ericàceæ*, retain the earth about them; so that plants of box always come up with a ball; and hence the tree may be transplanted at almost any season, provided, if in summer, that the weather be moist at the time. Box edgings are best planted early in spring, because the frost in winter is apt to destroy those leaves which have been cut in trimming the plants. Box edgings and hedges may be clipped at almost any season, except midwinter. Some gardeners prefer trimming box edgings in June, just when the plants have nearly completed their year's shoots; because they will afterwards make shoots of ½ in or 1 in. in length, or, at all events, protrude a few leaves, and thus, in a week or two, will conceal all appearance of the use of the shears. When this practice is followed, it is necessary to go over the edgings or hedges in July, in order to cut neatly off with the knife any shoots that may have been protruded too far; taking care not to cut the leaves. The more common practice is to clip the box in autumn; but in that case, as many of the leaves are injured by the shears, their marks remain till the middle of the following May. The edging or hedge looks well for a fortnight at that season; but afterwards it has rather a neglected appearance, till the next trimming season, which is in the beginning of September. The superiority of the June clipping must be obvious, whether applied to edgings, hedges, or mural or sculpturesque ornaments. Box edgings, when kept low, if they are wanted to endure many years, require occasionally to be cut in almost to the ground; and this operation should only be performed on one side of the edging in one year, and not on the other side till the second year following. When treated in this way, both edgings and hedges will, on good loamy soil, last an extraordinary length of time; whereas, if they are continually clipped on the surface only, a network of shoots is formed there, which, by excluding the air from the stem within, occasions the decay of the weakest; and the edging or hedge becomes naked below, and unsightly. Sometimes this evil may be remedied by cutting down; but, in general, the best mode is to replant. The form of the section of a box edging or hedge should always be that of a truncated triangle; the broadest end being that next to the ground. In the case of edgings to walks, or to flower-beds, their breadth at the ground may be 3 in., the height 4 in., and the breadth at top 2 in.; or half these dimensions may be adopted. In every case, both of edgings and hedges, the base ought always to be broader than the summit, in order that the rain may fall on the sides, and the light of the sun strike on them with more force. In clipping box trees into artificial forms, it is usual to enclose the tree in a slight frame of wirework of the form proposed: the wire should be copper, and painted green, for the sake of durability, and to render it inconspicuous. The same kind of skeleton wirework, or trellis-work, is put up for mural and architectural topiary work.

Insects and Diseases. The box is very rarely attacked by insects, and has very few diseases. There is a proliferous growth of leaves at the points of the shoots, which appears in some seasons, and is probably occasioned by the puncture of an insect, but of what species we are not aware. The fungus Puccínia Búxi *Grev.* (*fig.* 1219.) is found occasionally on the leaves.



1219

Statistics. The largest box trees in the neighbourhood of London are at Syon, where there are various trees from 13 ft. to 16 ft. in height. There is also one at Kew, 15 ft. high. In the Oxford Botanic Garden, there are two old box trees, one of which, in 1835, was 21 ft. high, the diameter of the trunk 7½ in., and of the head 18 ft. The largest box hedge in England is at Petworth, where it is more than 12 ft. broad at the bottom, 15 ft. high, and 40 yards long: it is supposed to be upwards of two centuries old. The oldest sculpturesque topiary works in England are in the garden at Leven's Grove, in Westmoreland, laid out in the time of James II. In Scotland, at West Plean, near Stirling, there is a box tree, 10 years planted, that is 6 ft. high. In France, in the Jardin des Plantes, a box tree, upwards of 100 years planted, has attained the height of 30 ft.

Commercial Statistics. Plants of the tree box, in the London nurseries, are from 6*d.* to 1*s.* 6*d.* each, according to the size of the variety: at Bollwyller plants of the species are 50 cents each; and of the varieties, from 1 franc to 1½ francs each: at New York, plants, or the tree kind are 25 cents each; and of its varieties, 37½ cents. The dwarf box is sold, in English nurseries, at 6*d.* per yard; at New York, at 50 cents per yard.

♀ 2. *B.* BALEA'RICA *Willd.* The Balearic Box.

Identification. Willd. Arb., 50., Sp. Pl. 4, p. 337.; ?Lam. Encyc., 1. p. 505.
Synonymes. *B. s.* var. gigantèa *N. Du Ham.*, 1. p. 82.; Minorca Box; Buis de Minorque, Buis de Mahon, *Fr.*; Balearischer Buchsbaum, *Ger.*
Engravings. N. Du Ham., pl. 23. f. 1.; and our *figs.* 1220. and 1221.

1220



Spec. Char., &c. Disk of leaf oblong; footstalk glabrous. Anthers arrow-shaped, linear. (*Willd. Sp. Pl.*, iv. p. 338.) A native of Minorca, Sardinia, and Corsica; and growing there, according to the *Nouveau Du Hamel*, to the height of 80 ft. It is also found in great abundance on all the rocky surfaces both of European and Asiatic Turkey. It was first brought to France about 1770; whence it was introduced into England in 1780. In both countries, it was at first treated as a green-house plant; but it was afterwards found quite hardy. In Paris, according to the *Nouveau Du Hamel*, it was found to resist the severe frosts of 1794 and 1799. The Balearic box is a very handsome species, with leaves three times as large as those of *B.* sempervirens, and a straight smooth trunk. The leaves, when the plant is fully exposed to the air, are of a much paler green than those of the common box; but, when they are in the shade, they are of an intensely deep green. The wood is said to be of a brighter yellow than that of the common box. It is sent to England in large quantities from Constantinople, for the use of the wood-engravers; but, being of a coarser grain, it is inferior to that of the *B.* sempervirens. It is propagated by cuttings, which, if placed in sandy soil under glass, or in heat, generally strike root in about two months after being taken off. Cuttings will also succeed, if treated like those of the common box.



1221

Statistics. The largest plant within 10 miles of London is at Kew, where it is 13 ft. high. At Walton on Thames, at Lady Tankerville's, it is 10 ft. high. In Sussex, at Arundel Castle, it is 17 ft. high. Price of plants, in the London nurseries, 1*s.* 6*d.* each; at New York, where it requires protection during winter, 37½ cents.

App. i. *Half-hardy Species of* Búxus.

B. chinénsis Lk. is a native of China, introduced in 1802, and growing about 3 ft. high; and *B. austràlis* Cun. is a native of New Holland, growing about 6 ft. high. Both require protection during winter, but would probably succeed against a conservative wall.

A true species of *Búxus*, Mr. Royle observes, is common in the Himalayas, found chiefly in valleys, as at Mugra, Kamaon, &c. It grows to a considerable size and thickness, and the wood appears as compact and good as that of the common box.

App. I. *Half-hardy Species belonging to the Order* Euphorbiàceæ.

On looking over the genera belonging to this order in the *Hortus Britannicus*, several ligneous species will be observed indicated as requiring the green-house; but, as very few of them are of much beauty, we consider it unnecessary to go into many details respecting them.

Plagiánthus divaricàtus Forst., t. 43., is a native of New Zealand, and was introduced in 1822. It is tolerably hardy; a plant having lived with us at Bayswater, with very little protection, since 1829. *P. sidöìdes* Hook. Bot. Mag., t. 3396., is a twiggy shrub, from 2 ft. to 3 ft. high, probably also as hardy as the other. Both species flower in April.

Cluytia alaternöìdes Bot. Mag., t. 1321., has been an inhabitant of our green-houses since 1692. It is a native of the Cape of Good Hope, and would probably stand against a conservative wall.

CHAP. C.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER *URTICA'CEÆ*.

These are included in five genera, which have their names and characters below.

Mo'rus *Tourn.* Flowers unisexual; those of the 2 sexes, in most species, upon the same plant; in *M.* nìgra *Poir.*, and, according to Gronovius (*Virg.*, 146.), in *M.* rùbra *L.*, upon distinct plants: according to Kalm (*Act. Suec.*, 1776), the sexes of *M.* rùbra *L.* are polygamous.—Male flowers disposed in a drooping, peduncled, axillary spike. Calyx of 4 equal sepals, imbricate in æstivation, expanded in flowering. Stamens 4. A rudiment of a pistil is present. — Female flowers in ovate erect spikes. Calyx of 4 leaves, in opposite pairs, the outer pair the larger, all upright and persistent, becoming pulpy and juicy. Ovary of 2 cells, one including one pendulous ovule, the other devoid of any. Stigmas 2, long. In the state of ripeness, each ovary is a fleshy and juicy utricle, and is covered by the fleshy and juicy calyx: the aggregate of the ovaries and the calyxes from a spike of flowers constitutes what is termed a mulberry. Seed pendulous — Species several; natives of Asia, south of Europe, and North America. Trees. Sap white. Leaves alternate, large, mostly lobed, and rough; the favourite food of the silk-moth (*Bómbyx* mòri *F.*) in its caterpillar state. (Chiefly from *T. Nees ab Esenbeck*, *Gen. Pl. Fl. Germ.*)

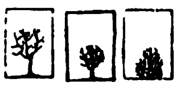
Broussone'*tia* L'Hérit. Flowers unisexual; those of the two sexes upon distinct plants. — Male flowers in pendulous cylindrical catkins; each flower in the axil of a bractea. Calyx shortly tubular, then 4-parted. Stamens 4, elastic.—Female flowers in peduncled, axillary, upright globular heads. Calyx tubular, its tip with 3—4 teeth. Ovary within an integument that arises from the bottom of the calyx. Style lateral, prominent. Stigma taper. Fruit club-shaped, proceeding from the bottom of the calyx, and extended much beyond its tip; and consisting of the integument in which the ovary was enclosed, and now become very juicy; and of a 1-seeded oval utricle with a crustaceous integument, and enclosed within the juicy. integument.— Species 1, native to Japan and the isles of the Pacific Ocean. A tree, with leaves large, lobed or not, and hairy. (*Du Hamel*, *Traité des Arbres*, ed. nouv.; and the *Penny Cyclopædia*.)

Maclu'*ra* Nuttall. Flowers unisexual; in M. aurantìaca *Nutt.*, and M. tinctòria *D. Don*, those of the two sexes upon distinct plants; if not so in the rest, then upon the same plant. What follows relates to M. aurantìaca *Nutt.* — Male flowers in a very short almost sessile racemose panicle of 12 or more flowers. Calyx 4-parted. Stamens 4, in some instances 3. — Female flowers closely aggregate upon an axis, and forming a globular head that is borne upon a short axillary peduncle. Calyx oblong, urceolar, apparently with 4 lobes at the tip: it includes the ovary, which is situated above its base, and is terminated by a style that is thread-shaped, downy, and protruded beyond the calyx to the length of nearly 1 in. The ovary becomes an achenium about ½ in. long, half as much broad, compressed, oval, with the tip blunt and unsymmetrical from an indentation on one side in which the style had been attached. — A tree, native of North America. Spiny: spines axillary. Sap white. Leaves alternate, ovate. Stipules minute, deciduous. (*Nuttall*; *Gard. Mag.*, vol. xi. p. 312—316., and vol. xii. p. 210.; and observation.)

FI`CUS *Tourn.* Flowers inserted upon the interior surface of a hollow globular or pear-shaped fleshy receptacle, in whose tip is an orifice closed with small scales; minute, many within a receptacle; those in the upper part male, the rest female; or the flowers of each sex occupy distinct receptacles upon distinct plants. — Male flower. Calyx 3-parted. Stamens 3. — Female flower. Calyx 5-cleft, having a tube that invests a threadshaped stalk that bears the pistil. Stalk adnate to the ovary on one side, and extending to the base of the style: the style is inserted rather laterally. Ovary with 1 cell and 1 ovule. Stigmas 2. Fruit a utricle. Seed pendulous. Embryo falcate, in the centre of fleshy albumen. — Species numerous. Trees or shrubs, occurrent in the warmer regions of both hemispheres. *F.* Cárica inhabits the south of Europe. Sap white. Leaves alternate, stipulate. Stipules large, convolute, deciduous. (*T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.* Most of the characters are taken from *F.* Cárica *L.*)

BO`RYA Willd. Flowers unisexual: those of the two sexes upon distinct plants. — Male flower. Calyx minute, in 4 deep segments. Stamens 2—3. — Female flower. Calyx inferior, in 4 deep segments, that are deciduous; two opposite ones very minute, and in some instances not present. Ovary roundish-ovate: it has 2 cells. Style short. Stigma capitate, depressed, obscurely cloven. Fruit pulpy, oval-oblong, with 1 cell. Seed mostly solitary; its skin membranous, its embryo straight, its albumen horny.—Species 5; 4 native of North America, 1 of the West Indies: all shrubs, with their leaves opposite, or nearly so, mostly smooth and entire; and their flowers minute, axillary, fascicled and bracteated. (*Smith,* under Bigelòvia in *Rees's Cycl.*; *Nuttall* in *Gen.*; and observation.)

GENUS I.



*MO`RUS Tourn.* THE MULBERRY TREE. *Lin. Syst.* Monœ`cia Tetrándria.

Identification. Tourn., quoted by T. Nees ab Esenbeck, in his Gen. Pl. Fl. Germ.; Schreb. Lin. Gen. Pl., No. 1494.; Willd. Sp. Pl., 4. p. 368.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. No. 5.

Synonymes. Mûrier, *Fr.*; Maulbeere, *Ger.*

Derivation. Several derivations have been given for the word *Mòrus*: some suppose it to be taken from the Greek word *morea*, or *moron*, signifying a mulberry or blackberry; others derive it from *mauros*, dark; and Sir J. E. Smith suggests that it may have been taken by antiphrasis from *mōros*, foolish, the mulberry tree, from its slowness in putting out its leaves, being anciently considered the emblem of wisdom. The Morea, in the Levant, is said to be so called from the resemblance of the shape of that peninsula to the leaf of a mulberry.

Description, &c. Deciduous trees, natives of Europe, Asia, and America, remarkable for their large leaves, which are mostly lobed, and which, in a state of cultivation, are liable to great variation in point of magnitude, form, and texture. They are easily propagated by seeds, layers, cuttings, and truncheons; every part of the mulberry, like the olive, taking root easily, and forming a tree. All the species will serve to nourish the silkworm; but *M.* álba, and its varieties, are considered much the best for this purpose. In warm climates, such as Persia, the leaves of *M.* nìgra are sufficiently succulent for feeding the silkworm; but in colder countries they do not answer equally well.

♀ 1. *M.* NI`GRA *Poir.* The black-*fruited, or common,* Mulberry.

Identification. Poir. Ency. Méth., 4. p. 377.; Lin. Sp. Pl., 1398.; Hort. Cliff., 441.; Mart. Mill., No.2.; Willd. Sp. Pl., 4. p. 369.

Synonymes. Mòrus *Dod. Pempt.*, 810.; *M.* frúctu nìgro *Bauh. Pin.*, 459.

Engravings. Ludw. Ectypa Veg., t. 114.; Blackw., t. 126.; Wats. Dend. Brit., t. 159.; N. Du Ham., 4. t. 22.; and the plate in our last Volume.

Spec. Char., &c. Sexes monœcious, sometimes diœcious. Leaves heart-shaped, bluntish, or slightly lobed with about 5 lobes; toothed with unequal teeth,

rough. (*Willd. Sp.*, iv. p. 369.) A deciduous tree, a native of Persia, but found also on the sea coast of Italy; growing to the height of 20 ft. or 30 ft. Introduced in 1548. Sir J. E. Smith remarks that this species is "sometimes perfectly diœcious, and very frequently partially so; the stamens being in greater perfection in most flowers of one tree, and the pistils in those of another." (*Rees's Cycl.*, art. Morus.)

Variety.

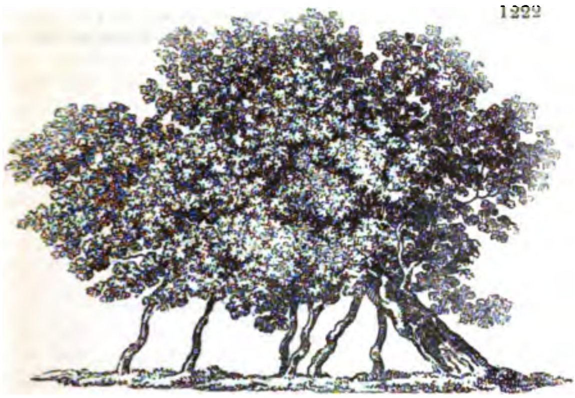
¶ M. *n.* 2 *laciniàta* Mill. Dict., No. 2., has the leaves jagged rather than cut. This alleged variety of the species may be considered as more properly a variation of the individual; since leaves jagged and lobed in a great variety of ways are frequently found on plants in one season, and only heart-shaped comparatively entire leaves the next!

Description. The common mulberry is generally a low, much-branched tree, with a thick rough bark, and broad heart-shaped leaves, which are unequally serrated, and very rough. The fruit is large, of a dark purple, very wholesome, and agreeable to the palate. The mulberry tree is remarkable for the slowness of its growth; and also for being one of the last trees to develope its leaves, though it is one of the first to ripen its fruit. In Britain, the tree always assumes something of a dwarf or stunted character, spreading into very thick arms, or branches, near the ground, and forming an extremely large head. It is a tree of very great durability; the trees at Syon being said to be 300 years old, and some at Oxford and other places being supposed to be of nearly equal antiquity. It is also wonderfully tenacious of life; the roots of a black mulberry, which had lain dormant in the ground for twenty-four years, being said, after the expiration of that time, to have sent up shoots. (*Ann. des Scien. Nat.*, tom. ix. p. 338., as quoted in *Brande's Journ.* for Oct. 1827.)

Geography. The common, or black, mulberry is generally supposed to be a native of Persia, where there are still masses of it found in a wild state; though the date of its introduction into Europe is unknown; and though it is occasionally found apparently wild in Italy. It is, however, so frequently confounded by the earlier writers with the white mulberry, as to render it difficult to ascertain the countries of which it is really a native.

History. The black mulberry has been known from the earliest records of antiquity. It is twice mentioned in the *Bible;* viz. in the Second Book of Samuel, and in the Psalms. The same difficulty, however, exists in tracing its history distinctly from that of the white mulberry, as in its geography; and it is only when spoken of as a fruit tree, or when its colour is decidedly mentioned, that we can be sure which species is meant. Ovid, however, evidently points out the black mulberry as the one introduced in the story of Pyramus and Thisbe; and Pliny seems also to allude to it, as he observes that there is no other tree that has been so neglected by the wit of man, either in grafting or giving it names; an observation which holds good to the present day respecting the black mulberry, as it has only one trifling variety, or rather variation, and no synonyme; whereas there are numerous varieties of *M.* álba. Pliny adds, "Of all the cultivated trees, the mulberry is the last that buds, which it never does until the cold weather is past; and it is therefore called the wisest of trees. But, when it begins to put forth buds, it despatches the business in one night, and that with so much force, that their breaking forth may be evidently heard." (Book xvi. c. 25.) The black mulberry was first brought to England in 1548; when some trees were planted at Syon, one, at least, of which (*fig.* 1222.) is still in existence. Others say that the first mulberry tree planted in England was in the garden at Lambeth Palace, by Cardinal Pole, about 1555. The tree is mentioned by Tusser, and also by Gerard, who describes both the black and the white mulberry as being cultivated in his time. The royal edict of James I., about 1605, recommending the cultivation of silkworms, and offering packets of mulberry seeds to all who would sow them, no doubt rendered the tree fashionable, as

1222



there is scarcely an old garden or gentleman's seat, throughout the country, which can be traced back to the seventeenth century, in which a mulberry tree is not to be found. It is remarkable, however, that, though these trees were expressly intended for the nourishment of silkworms, they nearly all belong to *Mòrus nìgra*, as very few instances exist of old trees of *Mòrus álba* in England. (See *Bradley's Treat. on Husb. and Gard.*, ed. 1726, vol. i. p. 349.) Shakspeare's mulberry is referable to this period, as it was planted in 1609 in his garden at New Place, Stratford; and it was a black mulberry, as Mr. Drake mentions a native of Stratford, who, in his youth, remembered frequently to have eaten of the fruit of this tree, some of its branches hanging over the wall which divided that garden from his father's. (*Drake's Shakspeare*, vol. ii. p. 584.)

Properties and Uses. The black mulberry is cultivated, Du Hamel tells us, "for its fruit, which is very wholesome and palatable; and not for its leaves, which are but little esteemed for silkworms;" and which, at the beginning of autumn, often become covered with red spots. The fruit, he adds, is eaten raw, or "made into syrups, which are considered excellent for sore throats." (*Nouv. Du Ham.*, iv. p. 91.) The wood is considered of but little value in France, except for fire-wood: it is less compact than even that of the white mulberry; and weighs only 40 lb. 7 oz. the cubic foot. Cattle eat the leaves, and all kinds of poultry are very fond of the fruit.

In England, the fruit is generally eaten at the dessert; and it is considered of a cooling aperient nature when ripe. It forms an agreeable sweetmeat, though it is not generally used for that purpose; and Evelyn says that, mixed with the juice of cider apples, it makes a very strong and agreeable wine. Dr. Clarke mentions that he saw some Greeks in the Crimea employed in distilling brandy from mulberries; which he describes as "a weak but palatable spirit, as clear as water." (*Travels*, vol. i. p. 529.) A wine is also made from it in France; but it requires to be drunk immediately, as it very soon becomes acid. The root has an acrid bitter taste, and is considered excellent as a vermifuge, in doses of half a drachm in powder. (*Smith* in *Rees's Cycl.*) The tree in every part contains a portion of milky juice, which, being coagulated, is found to form a kind of coarse Indian rubber. In some parts of Spain, on Mount Ætna, and in Persia, the leaves of this species are said to be preferred to those of the white mulberry for silkworms. (*Hook. Bot. Comp.*, vol. i. p. 59.)

Poetical and mythological Allusions. The mulberry was dedicated by the Greeks to Minerva, probably because it was considered as the wisest of trees; and Jupiter the Protector was called Morea. Ovid has celebrated the black mulberry tree in the story of Pyramus and Thisbe; where he tells us that its fruit was originally snow-white; but that when Pyramus, in despair at the

supposed death of his mistress, killed himself with his own sword, he fell under one of these trees; and when Thisbe, returning and finding him dead, stabbed herself also, their blood flowing over the roots of the tree, was absorbed by them, and gave its colour to the fruit.

> ' Dark in the rising tide the berries grew,
> And, white no longer, took a sable hue;
> But brighter crimson, springing from the root,
> Shot through the black, and purpled o'er the fruit."

Cowley describes the black mulberry as being used, in his time, both for its fruit and leaves: —

> " But cautiously the mulberry did move,
> And first the temper of the skies would prove,
> What sign the sun was in, and if she might
> Give credit yet to Winter's seeming flight:
> She dares not venture on his first retreat,
> Nor trusts her fruit and leaves to doubtful heat;
> Her ready sap within her bark confines,
> Till she of settled warmth has certain signs;
> Then, making rich amends for the delay,
> With sudden haste, she dons her green array:
> In two short months, her purple fruit appears,
> And of two lovers slain the tincture wears.
> Her fruit is rich, but she doth leaves produce
> Of far-surpassing worth and noble use."
>
> COWLEY *on Plants*, book v.

The destruction of Shakspeare's mulberry tree in 1756, by its then proprietor, Mr. Gastrell, gave rise to several songs, and other pieces of poetry; but they rather relate to the individual tree than to the species.

Soil, Situation, Propagation, and Culture. The black mulberry will grow in almost any soil or situation that is tolerably dry, and in any climate not much colder than that of London. In Britain, north of York, it requires a wall, except in very favourable situations. It is very easily propagated by truncheons or pieces of branches, 8 ft. or 9 ft. in length, and of any thickness, being planted half their depth in tolerably good soil; when they will bear fruit the following year. (See *Gard. Mag.*, vol. iii. p. 217., and vol. v. p. 63.) Every part of the root, trunk, boughs, and branches may be turned into plants by separation; the small shoots, or spray, and the small roots, being made into cuttings, the larger shoots into stakes, the arms into truncheons, and the trunk, stool, and roots being cut into fragments, leaving a portion of the bark on each. (*Ibid.*, vol. iv. p. 152.) It is very seldom, if ever, now propagated by seeds, which rarely ripen in Britain. The mulberry, from its slowness in putting out its leaves, being rarely injured by spring frosts, and its leaves being never devoured by any insect, except the silkworm, and never attacked by mildew, very seldom fails to bear a good crop of fruit. This fruit, however, though excellent and extremely wholesome, does not keep, and is so far troublesome, that it is only good when it is just quite ripe, and is best when it is suffered to fall from the tree itself. For this reason, mulberry trees are generally planted on a lawn or grass-plot, to prevent the fruit that falls from being injured by the dirt or gravel. In a paper by J. Williams, Esq., of Pitmaston, published in the *Horticultural Transactions* for 1813, this practice is, however, censured. " The standard mulberry," says Mr. Williams, " receives great injury by being planted on grass-plots with the view of preserving the fruit when it falls spontaneously. No tree, perhaps, receives more benefit from the spade and the dunghill than the mulberry; it ought therefore to be frequently dug about the roots, and occasionally assisted with manure. The ground under the tree should be kept free from weeds throughout the summer, particularly when the fruit is ripening, as the reflected light and heat from the bare surface of the soil is thus increased; more especially if the end branches are kept pruned, so as not to bow over too near to, and shade, the ground. The fruit is also very fine if the tree is trained as an espalier, within the reflection of a south wall, or other building. If a wooden trellis were constructed, with the same inclination as the roof of a forcing-house, fronting the south, and raised about

6 ft. from the ground, leaving the soil with the same inclination as the trellis, a tree trained on it would receive the solar influence to great advantage, and would probably ripen its fruit much better than a standard." (*Hort. Trans.*, &c.) When the mulberry is trained against a wall, and required to produce very large and fine fruit, the following mode of pruning is recommended by Mr. Williams: — "All the annual shoots, except the foreright, are neatly trained to the wall; but these last must be left to grow till towards midsummer, and then be shortened about one third of their growth, to admit light to the leaves beneath. By the end of August, the foreright shoots will have advanced again, so as to obstruct the light, and they must then be shortened nearer to the wall than before. In the month of March or beginning of April, the ends of the terminal shoots should be pruned away down to the first strong bud that does not stand foreright; and the front shoots, which were pruned in August, must also be shortened down to two or three eyes. If trained after this method, the tree will afford fruit the third year. The foreright shoots should then be shortened at the end of the month of June, or beginning of July, so as to leave one leaf only beyond the fruit; the terminal shoots being nailed to the wall as before, and left without any summer pruning; the foreright shoots, thus nailed, will not advance any farther, as their nutriment will go into the fruit; which, when quite ripe, will become perfectly black, very large, and highly saccharine." (*Ibid.*) As a standard tree, whether for ornament, or the production of moderately sized fruit, the mulberry requires very little pruning, or attention of any kind, provided the soil be tolerably good.

Statistics. *Mòrus nìgra in the Environs of London.* The oldest tree (supposed to be planted in the 16th century, by the botanist Turner,) is at Syon, where it is 22 ft. high. (See fig. 1222 in p. 1345.) There is another tree 28 ft. high, diameter of trunk 3 ft. 3 in., and of the head 57 ft. At Hampstead, at Kenwood, 38 years planted, it is 25 ft high, diameter of the trunk 1 ft. 1 in., and of the head 25 ft.; and at Mount Grove, Middlesex, 12 years planted, it is 9 ft. high, diameter of the trunk 2½ in. At Battersea, on the estate of Earl Spenser, one, 300 years old, is from 30 ft. to 40 ft. high, the diameter of the head 70 ft. by 50 ft.; with 14 trunks, averaging about 1 ft. in girt at 1 ft. from the ground.

M. nìgra South of London. In Devonshire, at Bystock Park, 22 years planted, it is 17 ft. high, diameter of the trunk 7 in. In Kent, at Canterbury, in a garden which belongs to the ruins of the Abbey of St. Augustine, is a mulberry tree of great antiquity. It had once been a tree of considerable height; but is supposed to have been blown down about the end of the 17th, or beginning of the 18th, century. The trunk lies horizontally along the ground; and is in length 21½ ft., and about 2 ft. in diameter, at 4 ft. from the root. Two large branches have risen perpendicularly from this trunk, and now form trees with trunks, the one 8 ft. high, and about 14 in. in diameter, where it proceeds from the main trunk; and the other still higher and thicker. This tree was inspected by the deputation of the Caledonian Horticultural Society, when on their way to France, in August, 1817. "On examination" they "perceived that a continuous portion of the bark was fresh all the way from the original root; and by removing a little of the earth" they "likewise ascertained that many new roots, though of small size, had been sent off from the base of the two branches which had formed themselves into stems and heads." "The fruit of this aged tree," the deputation add, "is excellent; indeed it is commonly said that the fruit of the oldest mulberry trees is the best. In 1815, the berries, sold at 2*s.* a pottle, yielded no less than 6 guineas." (*Journal of a Hort. Tour*, &c., p. 14.) We are informed by Mr. Masters of Canterbury, that this tree has increased considerably in size since 1817; the two trees being now, the one 19 ft. high, with a head 25 ft. in diameter; and the other 16 ft. high, with a head 20 ft. in diameter. In Somersetshire, at Hinton House, 18 years planted it is 14 ft. high, diameter of the trunk 6 in., and of the head 13 ft.; at Nettlecombe, 45 years planted, it is 24 ft. high, diameter of the trunk 1 ft. 4 in., and of the head 26 ft. In Surrey, near Ripley, at Sutton Place, is a very old mulberry tree, which must have been blown down early in the 18th century, as the branches from the prostrate trunk have all the appearance of old trees. The house at Sutton Place was built by the brewer of Henry VIII., about the end of that king's reign. In Sussex, at Cowdray, it is 25 ft. high, with a trunk 1 ft. 8 in. in diameter. In Wiltshire, at Wardour Castle, 100 years old, it is 40 ft. high, diameter of the trunk 1 ft. 6 in., and of the head 26 ft.

M. nìgra North of London. In Bedfordshire, at Ampthill, 85 years planted, it is 25 ft. high, diameter of the trunk 25 in., and of the head 30 ft. In Cambridgeshire, in the grounds of Christ Church College, at Cambridge, is one planted by Milton when a student of the college, 20 ft. high, diameter of the trunk 2 ft. 2 in., and of the head 30 ft. In Cheshire, at Kinmel Park, it is 20 ft. high, diameter of the trunk 16 in., and of the head 20 ft. In Cumberland, at Ponsonby Hall, 45 years planted, it is 24 ft. high, diameter of the trunk 1 ft. 2 in., and of the head 18 ft. In Gloucestershire, at Doddington, 50 years planted, it is 25 ft. high, diameter of the trunk 1½ ft., and of the head 90 ft. In Leicestershire, at Whatton House, 26 years planted, it is 13 ft. high, against a wall, circumference of the trunk 1 ft. 4 in., and of the head 70 ft. In Oxfordshire, in the Common Room Garden, at Pembroke College, are two mulberry trees, which are said to have been planted before the college was founded, which was in 1624. One of these is only about 25 ft. high, but it has a trunk 2 ft. 2 in. in diameter at 4 ft. from the ground; a little higher it divides into two large arms, one of which girts 5 ft., and the other 3 ft. 1 in. The other tree appears to have been much larger, but is now decayed. In Pembrokeshire, at Golden Grove, 60 years planted, it is 25 ft. high, diameter of the trunk 2 ft., and of the head 14 ft. In Radnorshire, at Maeslaugh Castle, 26 ft. high, diameter of trunk 1 ft., and of the head 30 ft. In Rutlandshire, at Belvoir Castle, 10 years planted, it is 15 ft. high, diameter of the trunk 4 in., and of the head 8 ft. In Suffolk, at Finborough Hall, 70 years planted, it is 40 ft. high, diameter of the trunk 2 ft., and of the head 42 ft.; at Ampton Hall, 12 years planted, it is 10 ft. high, diameter of the trunk 6 in., and of the head 16 ft. In Worcestershire, at Croome, 40 years planted, it

is 80 ft. high, diameter of the trunk 15 in., and of the head 25 ft. At Hagley, 20 years old, it is 10 ft. high, diameter of trunk 18 in., and of the head 11 ft.

M. nigra in Scotland. The following specimens are all against walls. In Mid-Lothian, at Gosford House, 15 ft. high, diameter of the trunk 1 ft. 3 in., and of the space covered by the branches 21 ft. In Haddingtonshire, at Tynningham, 14 ft. high, diameter of the trunk 1 ft. 8 in., and of the head 30 ft. In Renfrewshire, at Erskine House, 15 ft. high, diameter of the trunk 1 ft. 2 in., and of the head 17 ft. In Banffshire, at Gordon Castle, 12 ft high, against a wall. In Perthshire, at Kinfauns Castle, 8 years planted, and 4 ft. high. In Ross-shire, at Brahan Castle, 6 years old, and 10 ft. high, extent of the branches 18 ft.

M. nigra in Ireland. Near Dublin, in the grounds at Terenure, there is a remarkable specimen, the trunk of which divides, close by the ground, into five limbs, nearly of equal bulk, the largest exceeding 10 in. in diameter, height 25 ft., circumference of the head 130 ft. At Castletown, 30 ft. high, diameter of the trunk 2 ft. 6 in., and of the head 30 ft. In Galway, at Coole, 14 ft. high, diameter of the trunk 8 in., and of the head 14 ft. In Sligo, at Makree Castle, 8 years old, it is 8 ft. high, diameter of the trunk 5 in., and of the head 7 ft.

M. nigra in Foreign Countries. In France, at Nantes, in the nursery of M. De Nerrières, 60 years planted, it is 49 ft. high, with a trunk 2½ ft. in circumference. In the Botanic Garden, at Avranches, 40 years planted, it is 40 ft. high, the diameter of the trunk 1 ft., and of the head 20 ft. In Saxony, at Wörlitz, 30 years old, it is 19 ft. high; the diameter of the trunk 6 in. In Cassel, at Wilhelmshöhe, 7 years planted, it is 6 ft. high. In Bavaria, at Munich, in the Botanic Garden, 18 years planted, it is 20 ft. high. In Austria, near Vienna, at Brück on the Leytha, 42 years old, it is 33 ft. high, the diameter of the trunk 9 in., and of the head 15 ft. In Prussia, near Berlin, at Sans Souci, 70 years old, it is 30 ft. high, the diameter of the trunk 14 in., and of the head 11 ft. In the Pfauen Insel, 40 years old, it is 30 ft. high, the diameter of the trunk 13 in., and of the head 44 ft.

♆ 2. *M.* A'LBA *L.* The white-*fruited* Mulberry Tree.

Identification. Lin. Hort. Cliff., 441.; Mill. Dict., No. 3.; Willd. Sp. Pl., 4. p. 368.; N. Du Ham., 4. p. 87.

Synonymes. *M.* cándida *Dod. Pempt.*, 810.; *M.* frúctu álbo *Bauh. Pin.*, 459.; *M.* álba fructu minori albo insulso *Du Ham. Arb.*, 2. p. 24.

Engravings. Schkuhr Handb., 3. 290.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. No. 5. f. 1—6., the male; and our plate in Vol. III.

Spec. Char., &c. Leaves with a deep scallop at the base, and either heart-shaped or ovate, undivided or lobed, serrated with unequal teeth, glossy, or, at least, smoothish; the projecting portions on the two sides of the basal sinus unequal. (*Willd. Sp. Pl.*) A deciduous tree, growing to the height of 30 ft. A native of China. Introduced in 1596; flowering in May, and ripening its fruit in September.

Varieties.—These are extremely numerous; and the same kinds are even distinguished in different countries by different names. The following are some of those most generally cultivated for their leaves, as affording food for the silkworm: —

♆ ■ M. *a.* 2 *multicaúlis* Perrottet in Ann. de la Soc. Lin. de Paris, Mai, 1824, p. 129., Lodd. Cat., ed. 1836; *M.* tatárica *Desf.*, but not of Lin. or Pall.; *M.* bullàta *Balbis*; *M.* cucullàta *Hort.*; Chinese black Mulberry, *Amer.*; Perrottet Mulberry, many-stalked Mulberry; Mûrier Perrottet, *Fr.*; Mûrier à Tiges nombreuses, Mûrier des Philippines, *Ann. des Sci.*, i. p. 336. pl. 3.; and our *fig.* 1223.; Moro delle Filippine, *Ital.* — This variety was introduced into France, in 1821, by M. Perrottet, "agricultural botanist and traveller of the marine and colonies of France," from Manilla, the capital of the Philippine Islands; into which country it had been brought as an ornamental tree, some years previously, from China. It is considered, both in Italy and France, as by far the best variety for cultivation as food for the silkworm. It is a tree, or, rather, a gigantic shrub, as the name implies, of rapid growth, with vigorous shoots, and large pendulous leaves, which, even in poor dry soils, are 6 in. long, and 8 in. or 9 in. broad; but which, in rich humid soils, are often 1 ft. in breadth, and 15 in. or 16 in. in length. They are convex on the upper surface, of a beautiful glossy green, and of a succulent texture. The fruit of this variety was unknown in Europe till 1830. It is long, black, and of a flavour some-



1223

what resembling that of the common black mulberry. This variety of mulberry differs from all the others, in throwing up suckers freely from the roots. It also strikes more readily by cuttings, either of the young or old wood, than any other variety. It is extensively propagated in the French and Italian nurseries; and it has also become a favourite variety in North America. In the *Gardener's Magazine*, vol. xii., the numerous good qualities of this variety will be found pointed out in detail, by Signor Manetti of Monza. See, also, Kenrick's *American Orchardist*, and the *American Gardener's Magazine*, vol. i. p. 310. and 336., and vol. ii. p. 33. From the colour and excellence of the fruit, we think it highly probable that this sort of mulberry belongs rather to *M.* tatárica *Pall.*, than *M.* álba.

♀ M. *a.* 3 *Morettiàna Hort., Lodd. Cat.*, ed. 1836; Dandolo's Mulberry; has black fruit, and very large, perfectly flat, deep green, shining leaves, which are thin, and perfectly smooth on both surfaces. Its leaves rank next to those of *M.* a. multicaúlis as food for silkworms; and the silk made by worms fed on them is of a beautiful gloss, and of a finer quality than any other. It is, however, neither so productive nor so hardy as *M.* a. multicaúlis. It was first brought into notice in 1815, by M. Moretti, professor in the university of Pavia; whence its name of Morettiàna. Its name of Dandolo Mulberry was given in honour of Count Dandolo, who has not only devoted much time to the improvement of the culture of the silkworm, but has written an excellent work on the subject.

♀ M. *a.* 4 *macrophýlla* Lodd. Cat., ed. 1836; *M.* a. latifòlia Hort.; *M.* hispánica *Hort.*; Mûrier d'Espagne, Feuille d'Espagne, *Fr.*—This variety produces strong and vigorous shoots, and large leaves, sometimes measuring 8 in. long, and 6 in. broad, resembling in form those of *M.* nìgra, but smooth, glossy, and succulent. The fruit is white. If grown in rich soils, this sort, it is stated in the *Nouveau Cours d'Agriculture*, is apt to produce leaves which are so exceedingly succulent and nourishing, that they occasion the worms fed on them to burst. It is a most valuable variety for poor soils, particularly in rocky calcareous situations.

♀ M. *a.* 5 *romàna* Lodd. Cat., ed. 1836; *M.* a. ovalifòlia; Mûrier romain, *Fr.*; bears so close a resemblance to the above sort, as not to require any more particular description.

♀ M. *a.* 6 *nervòsa* Lodd. Cat., ed. 1836; *M.* nervòsa *Bon Jard.*, 1836; *M.* subálba nervòsa *Hort.*; has the leaves strongly marked with thick white nerves on the under side. There is a subvariety (*M.* n. 2 longifòlia) mentioned in the *Bon Jardinier*, which has longer leaves.

♀ M. *a.* 7 *itálica* Hort.; *M.* itálica *Lodd. Cat.*, ed. 1836; has a lobed leaf. In 1825, and for a few years before and after, while attempts were making to introduce the culture of silk into England and Ireland, this variety was principally planted. The plants were imported from the Continent, chiefly by Messrs. Loddiges. M. *a. i. rùbra*, the *M.* rùbra of *Lodd. Cat.*, ed. 1836, is a subvariety of this sort.

♀ *M. a.* 8 *ròsea* Hort., Lodd. Cat., ed. 1836; the small white Mulberry; Mûrier rose, Feuille rose, *Fr.*; is one of the kinds called, in France, a wild variety. The fruit is small, white, and insipid; and the leaves resemble the leaflets of a rose tree, but are larger. This kind is said to produce remarkably strong silk.

♀ M. *a.* 9 *columbássa* Lodd. Cat., ed. 1836; Columba, *Fr.*; has small delicate leaves, and flexible branches. It is considered the most tender of all the kinds.

♀ M. *a.* 10 *membranàcea* Lodd. Cat., ed. 1836; Mûrier à Feuilles de Parchemin, *Fr.*; has large, thin, dry leaves.

♀ M. *a.* 11 *sinénsis* Hort.; *M.* sinénsis *Hort.*; *M.* chinénsis *Lodd. Cat.*, ed. 1836; the Chinese white Mulberry, *Amer.*; is a large-leaved variety.

♣ M. *a.* 12 *pùmila* Nois., ? *M.* a. nàna *Hort. Brit*, is a shrub, seldom exceeding 10 ft. high. There are plants bearing this name in the arboretum of Messrs. Loddiges, which have leaves nearly as large as those of *M.* a. macrophýlla.

Other Varieties. All the above sorts are in the arboretum of Messrs. Loddiges; but in the catalogues of foreign nurserymen there are several other names. In the Humbeque Nursery, near Brussels, a number of varieties are cultivated for the American market, where the white mulberry is now much in demand; and a list of their names will be found in *Gardener's Magazine*, vol. xi. p. 539. Castelet, in his *Traité sur les Mûriers blancs*, which is generally considered the best work on the subject extant in France, divides the varieties of *M.* álba, now cultivated in Provence for their leaves, into two classes, the wild and the grafted; the latter being propagated by grafting, and the former by cuttings, layers, or seeds.

Wild Mulberries.

La Feuille rose.—This is the same as *M.* a. 8 *rósea*, mentioned above.

La Feuille dorée, *M.* a. lùcida *Hort.*, *M.* lùcida *Hort.*, which has large, heart-shaped, shining leaves, and small purplish fruit.

La Reine bâtarde has the leaves twice as large as those of the *Feuille rose*, and deeply toothed. This is probably the *Foglia zazola* of the Italians.

La Femelle.—Tree spiny, and sending forth its fruit before its leaves, which are trilobate.

Grafted Mulberries.

La Reine, which has shining leaves, much larger than any of the wild varieties; and ash-coloured fruit.

La grosse Reine.—This is a subvariety of *M.* a. macrophýlla, which has the leaves of a very deep green, and the fruit black, instead of white.

La Feuille d'Espagne.—This variety is the same as *M.* a. 4 macrophýlla, mentioned above.

La Feuille de flocs has the leaves of a very deep green, and growing in tufts at the extremities of the branches. The fruit is produced in abundance, but never arrives at maturity. This is probably the *Foglia doppia*, or double-leaved variety, of the Italian gardeners.

Besides these, there are many garden varieties in the French, German, and Italian nurseries.

Description, &c. The white mulberry is readily distinguished from the black, even in winter, by its more numerous, slender, upright-growing, and white-barked shoots. It is a tree of much more rapid growth than *M.* nìgra, and its leaves are not only less rough and more succulent, but they contain more of the glutinous milky substance resembling caoutchouc, which gives tenacity to the silk produced by the worms fed on them. They are generally cordate and entire, but sometimes lobed, and always deeply serrated. The fruit of *M.* álba and its wild varieties is seldom good for human food, but it is found excellent for poultry; and, for this purpose, a tree of the species was formerly generally planted in the *basse cour* of the old French châteaux. (*Bosc.*) The fruit of *M.* a. multicaùlis, and some other of the highly cultivated varieties, is not only eatable, but agreeable. The rate of growth of young plants is much more rapid than that of *M.* nìgra; plants cut down producing shoots 4 ft. or 5 ft. long in one season; the tree attaining the height of 20 ft. in five or six years; and, when full grown, reaching to 30 ft. or 40 ft. Its duration is not so great as that of *M.* nìgra.

Geography. The white mulberry is only found truly wild in China, in the province of Seres, or Serica; it is, however, apparently naturalised in many parts of Asia Minor and Europe; and nearly all its varieties are of European origin. It does not embrace so extensive a range of country as *M.* nìgra, being unable to resist either great cold or great heat. In a cultivated state, it is found, as a road-side pollard tree, in many parts of France, Spain, Italy, and Germany as far north as Frankfort on the Oder. In England, it is not very common; and it is scarcely to be found in Scotland, even against a wall.

History, &c. The Chinese appear to have been the first to cultivate the mulberry for feeding silkworms; and they are supposed to have discovered the art of making silk 2700 years B. C., in the reign of the Emperor Hong, whose empress, Si-ling-chi, is said to have first observed the labours of the silk-

worms on wild mulberry trees, and applied their silk to use. From China, the art passed into Persia, India, Arabia, and the whole of Asia. The caravans of Seres, or Serica (the part of China where the silk was most abundantly produced), "performed long journeys, of 243 days, from the 'far coasts' of China to those of Syria. The expedition of Alexander into Persia and India first introduced the knowledge of silk to the Grecians, 350 years before Christ; and, with the increase of wealth and luxury in the Grecian court, the demand for silks prodigiously augmented. The Persians engrossed, for a time, the trade of Greece, and became rich from the commerce of silk, which they procured from China. The ancient Phœnicians also engaged in the traffic of silk, and carried it to the east of Europe; but, for a long time, even those who brought it to Europe knew not what it was, and neither how it was produced, nor where was situated the country of Serica, from which it originally came." (*Kenrick's Amer. Silk-Grower's Guide*, p. 11.; *N. Du Ham.*, 4.; *Nouv. Cours d'Agric.*, &c.) From Greece it passed into Rome; and, though the exact year of its introduction is unknown, it was probably about the time of Pompey and Julius Cæsar; the latter, we find, having used it in his festivals. In the reign of Tiberius, an edict was passed prohibiting the use of silk as effeminate. Heliogabalus, about 220, is said to have been the first emperor who wore a robe made entirely of silk; which then, and for some time afterwards, sold for its weight in gold. Aurelian, in 280, is said to have denied his empress, Severa, a robe of silk, because it was too dear. About the beginning of the sixth century, after the seat of the Roman empire had been transferred to Constantinople, two monks arrived at the court of the Emperor Justinian, from a missionary expedition into China: they had brought with them the seeds of the mulberry, and communicated to him the discovery of the mode of rearing silkworms. Although the exportation of the insects from China was prohibited on pain of death, yet, by the liberal promises and the persuasions of Justinian, they were induced to undertake to import some from that country; and they returned from their expedition through Bucharia and Persia to Constantinople in 555, with the eggs of the precious insects, which they had obtained in the "far country," concealed in the hollow of their canes, or pilgrim's staves. Until this time, the extensive manufactures of Tyre and Berytes had received the whole of their supply of raw silk from China through Persia. (See *M'Culloch's Dict. of Com.*, *Nouv. Cours*, and *Amer. Silk-Grower's Guide.*) "The eggs thus obtained were hatched in a hot-bed, and, being afterwards carefully fed and attended to, the experiment proved successful, and the silkworm became very generally cultivated throughout Greece."(*Sat. Mag.* vol. iii. p. 2.) The silkworm and the black mulberry were introduced simultaneously into Spain and Portugal by the Arabs, or Saracens, on their conquest of Spain in 711. When the silkworm was first introduced into the north of Europe, there appears little doubt but that it was fed on the leaves of the black mulberry. The white mulberry is more tender; and, putting forth its leaves much earlier than the black mulberry, it is more likely to be injured by spring frosts. It was, consequently, long confined to Greece; but, when Roger, king of Sicily, in 1130, ravaged the Peloponnesus, he compelled the principal artificers in silk, and breeders of silkworms, to remove with him to Palermo, and determined to try the white mulberry in that country. The white mulberry was accordingly transplanted into Sicily; and, flourishing in its fine climate, that island became the great mart of nearly all the raw silk required for the manufactures of Europe. On Mount Ætna, the *Mòrus nigra* is grown at an elevation of 2500 ft., for the silkworm, to the exclusion of *M. álba*, probably on account of the tenderness of the latter tree in that elevated region. (See Dr. R. A. Philippi on the vegetation of Mount Ætna, in the *Linnæa*, as quoted in *Hook. Comp. Bot. Mag.*, vol. i. p. 50.) In 1440, the white mulberry was introduced into Upper Italy; and, under the reign of Charles VII., the first white mulberry tree was planted in France, as it is said, by the Seigneur d'Allan; and it is added that this tree still exists at the gates of Montelimart. Silk manufactures were first established in France in 1480, at Tours. This was in the reign of Louis XI.; that monarch having invited

workmen from Italy to settle in France. The manufactures, thus established, were, however, at first entirely supplied with their raw silk from Piedmont and Sicily. In 1494, several of the great landed proprietors who had followed Charles VIII. in his Italian wars, brought with them, on their return from Naples and Sicily, some plants of the white mulberry, which they planted in Provence, in the vicinity of Montelimart. In 1520, Francis I., having taken possession of Milan, prevailed on some artisans of the city to establish themselves at Lyons; and, to encourage them to remain there, he granted them especial privileges and immunities. Henry II. and Charles IX. appear to have been the next sovereigns who endeavoured to promote the culture of the mulberry and the silkworm in France; and in the reign of the latter monarch, in 1564, François Traucat, a gardener of Nismes, formed a large nursery, expressly for raising white mulberry plants, from which he supplied all the south of France. Henry IV. was no sooner established on the throne, than he exerted himself to promote the culture of the silkworm throughout his dominions; and by his desire, Olivier de Serres, seigneur de Pradel, in 1601, formed a plantation of white mulberry trees in the garden of the Tuileries, where a large building for the silkworms was erected. (*Ann. d'Hort.*, vol. xviii. p. 130.) In 1603, an edict was passed for encouraging the planting of mulberry trees throughout France; promising to reward such manufacturers as had supported and pursued the trade for twelve years with patents of nobility. (See *M'Culloch's Dict. of Commerce*, p. 1029.) Under Louis XIII. the silk manufactures of France were neglected; but they were again brought under the attention of the government in the reign of Louis XIV.; whose minister, Colbert, seeing the advantages that might be drawn from the culture of mulberry trees, resolved to enforce it by every means in his power. He reestablished the royal nurseries; gave plants to all who desired them; and even planted by force the lands of those proprietors who were not willing to cultivate the trees voluntarily. This arbitrary measure disgusted the proprietors, and the mulberry plantations were soon suffered to decay. Colbert now tried more gentle measures; and he offered a premium of 24 sous for every mulberry that had stood in a plantation three years. This plan succeeded; and, in the course of a few years, mulberry plantations were general throughout France. (See *Nouv. Cours d'Agricult.*, art. Mûrier.) At present the silk manufactures of France constitute a very important part of her commerce; and some idea may be formed of the silk goods annually sent to England from that country, from the fact, that the quantity on which duty was paid, from 1688 to 1741, averaged 500,000*l.* a year. (*M'Culloch.*) It is, however, remarkable, that, notwithstanding the great quantity of silk now raised in France, the manufacturers of that country still import to the annual value of 30,000 francs of raw silk from Piedmont and Italy. The culture of silk was first introduced into Germany by Frederick II., who had mulberry trees planted extensively in different parts of his dominions; and the example was soon afterwards followed in Saxony, Austria, and in some of the smaller states. In Bavaria, the silk culture was commenced under the auspices of government, and of the Munich Agricultural Society, about 1820, at the recommendation of a highly patriotic individual, M. Hazzi. A great many mulberry plants have since been raised in the government nurseries, and distributed throughout the provinces (see *Gard. Mag.*, vol. v. p. 424.); but, on the whole, neither in this part of Germany, nor in any other, have the silk manufactories ever been considerable. In many of the southern states, pollarded mulberry trees may be seen bordering the highways; and in some of the cities silk goods are made from German silk; but the only establishments of this kind worth mentioning are at Vienna, at Roveredo in the Tyrol, at Creveldt, at Cologne, and at Berlin. The culture of silk has been introduced into Belgium (*Ann. d'Hort. de Paris*, vi. p. 368.), with every prospect of success; and the tree has also been planted in the southern states of Denmark. In Sweden, an attempt has been made to introduce silk culture in the southern provinces; but, as far as we have been able to learn, with very little success. In Russia, silk culture has been

commenced in the Crimea, by the planting of all the best varieties of *M.* álba in the government garden at Odessa; where, according to M. Descemet (*Tab. Hist.*, &c., p. 55.), they succeed perfectly. In Spain, the culture of silk was introduced, as we have already seen, by the Arabs; and it is universally allowed to have been in a highly flourishing state in the fifteenth century; but it has declined ever since; and at the present day, as Capt. S. E. Cook informs us, it is one of the most neglected branches of agriculture in Spain; being almost confined "to Valencia, Catalonia, Murcia, and a part of Grenada." (*Sketches in Spain*, &c., vol. ii. p. 38.) In Egypt, the culture of silk was introduced some years since, by the Paçha Ibrahim, and it is in a prosperous state. *M.* a. multicaúlis is also mentioned among the trees that have been planted in the government gardens at Algiers. (See p. 178.)

The first record of silk in Britain is of a present sent by Charlemagne to Offa, king of Mercia, in 780, consisting of a belt and two silken vests. Silk is mentioned in a chronicle of the date of 1286, in which we are told that some ladies wore silk mantles at a festival at Kenilworth about that period; and, by other records, we find that silk was worn by the English clergy in 1534. Henry VIII. had the first pair of silk stockings that were ever seen in England sent to him from Spain; and Edward VI. had "a pair of long silk hose," from the same country, presented to him by Sir Thomas Gresham (who built the Royal Exchange); "a present which was thought much of." (*Howell's Hist. of the World*, iii. p. 222.) These stockings were cut out of a piece of silk, and sewed together, like the cloth hose that were worn previously; the first knit silk stockings were worn in England by Queen Elizabeth. Silk manufactures were introduced into England in the fifteenth century; but they do not appear to have made much progress "till the age of Elizabeth; the tranquillity of whose long reign, and the influx of the Flemings, occasioned by the disturbances in the Low Countries, gave a powerful stimulus to the manufacturers of England." (*M'Culloch.*) In 1609, James I., probably in imitation of Henry IV., passed his famous edict for introducing the culture of the silkworm into Britain (see p. 1344.); and from the *Issues of the Exchequer*, &c., of his reign, lately published, it appears that he planted largely himself. One of the entries in this curious work is an order, dated Dec. 5. 1608, directing the payment to "Master William Stallenge" of the "sum of 935*l.*, for the charge of four acres of land, taken in for His Majesty's use, near to his palace of Westminster, for the planting of mulberry trees; together with the charge of walling, levelling, and planting thereof with mulberry trees," &c. By another entry, we find that the attempt to rear silkworms was not hastily abandoned; as it contains an order, dated January 23. 1618, nine years after the preceding one, for 50*l.* to be paid the keeper of His Majesty's house and gardens at Theobald's, "for timber-board, glass, and other materials, together with workmanship, for making a place for His Majesty's silkworms, and for making provision of mulberry leaves for them." Hartlib, in his *Legacy*, &c., printed in 1652, quotes some passages from *Boneil on Mulberries*, a work, printed in 1609; and among others a letter from King James to his lords lieutenants, recommending the planting of mulberry trees, and offering them at 2 farthings each. (See *Legacy*, &c., ed. 2., p. 59.) Though this attempt to rear silkworms in England proved unsuccessful, the manufacture of the raw material, supplied by other countries, was extraordinarily flourishing. The silk-throwsters (twisters) of the metropolis were united into a fellowship in 1562; and were incorporated in 1629. Though retarded by the civil wars in the time of Charles I. and the commonwealth, the manufacture continued gradually to advance; and so flourishing had it become, that it is stated in a preamble to a statute passed in 1666 (13 & 14 Chas. 2. c. 15.), that there were at that time no fewer than 40,000 individuals engaged in the trade. (*M'Culloch.*) A considerable stimulus was given to the English silk manufacture by the revocation of the Edict of Nantes in 1685; when above 50,000 French artisans took refuge in England. At this period, the consumption of silk goods was so great in England, that, besides the quantity

manufactured in the country, from 600,000*l.* to 700,000*l.* worth were imported annually. In 1719, the first silk mill was erected at Derby. After the failure of James I.'s attempts to establish the silkworms and the mulberry, no effort of any importance seems to have been made for many years; though several individuals had, at different times, reared the worms, and produced silk. In 1825, however, a company was established, under the name of "The British, Irish, and Colonial Silk Company," with a large capital, and under the direction of the celebrated Count Dandolo, whose treatise on the management of the silkworm, &c., is considered the best work extant on the subject in Italy. This company formed extensive plantations in England and Ireland, particularly near Slough, and near Cork; and Mr. John Heathcoat of Tiverton, Devonshire, one of its most influential members, invented a method of reeling which was attended with the most complete success. The company also formed plantations in Devonshire: but, after numerous trials, it was found that the climate of the British Isles was too humid for the production of useful silk; and the company was finally broken up, and its plantations destroyed, in 1829. For further details respecting this company, and its operations, see *Encyc. of Agric.*, 2d edit., p. 1105. The cause of the entire failure of this spirited undertaking, as well as that of James I., will, we think, be found in the following very judicious observations from the *Journal d'Agriculture des Pays-Bas;* which will show the impracticability of any future attempt to rear silkworms as an article of commerce in Britain, or in any similar climate:— "The mulberry tree is found in different climates; but the juice of the leaves grown in the north is much less suitable for the production of good silk, than that of the leaves of the south. In this respect, mulberry leaves and silk differ as much as wines, according to the climate and soil in which they are produced. In general, every climate and soil that will grow good wheat will produce large succulent mulberry leaves; but these leaves will, in many cases, be too nutritive; that is, they will have too much sap, and too much substance and succulency. The wild mulberry, with small leaves, answers better, for such a soil, than the grafted mulberry, with large leaves. A general rule, and one to be depended on, is, that the mulberry, to produce the best silk, requires the same soil and exposure that the vine does to produce the best wine. Experience has proved that silkworms nourished by leaves gathered from a dry soil succeed much better, produce more cocoons, and are less subject to those diseases which destroy them, than those which have been nourished by leaves produced by an extremely rich soil." (See *Gard. Mag.*, vol. iv. p. 52.) The silkworm was introduced into America by James I.; who, at the same time that he published his edict for the planting of the mulberry tree in England, sent over mulberry trees and silkworms to Virginia, accompanied by a book of instructions for their culture, and exhortations to the inhabitants to pursue it instead of that of tobacco. The worms thus introduced were partially cultivated; but, not being so lucrative as tobacco, rice, and indigo, they made but small progress till the time of Dr. Franklin. That truly great man established a silk manufactory at Philadelphia, which was put a stop to by the war of independence. Silk has still continued to be raised in some remote parts of the country; but it is only since about 1825 that any establishments have been formed on a large scale. It is now produced extensively through all the southern provinces of the United States; and it seems probable, from the heat and dryness of the American summers, that it will equal the silk of Italy. Since the introduction of *M.* a. multicaúlis into America, which took place in 1831, an attempt has been made to obtain two crops in one year, which, it is said, is attended with every prospect of success. The same may be observed of the culture of silk in South America, in which it has been commenced at Rio Janeiro, the Caraccas, Buenos Ayres, and other places.

In India, the culture of the mulberry and the silkworm continues to be practised; but how far it will be promoted or retarded by the progress of this culture in Europe and America remains to be proved. It appears probable, however, from the superior climate of Eastern Asia, that, when general com-

merce is once free, it will far exceed its former extent. In Australia, the culture of silk has been commenced, and it appears likely to succeed in that fine climate; but very little, as yet, can be said on the subject with certainty. One great object that we have had in view, in giving this article at such length, is, the promotion of silk culture in that interesting part of the world.

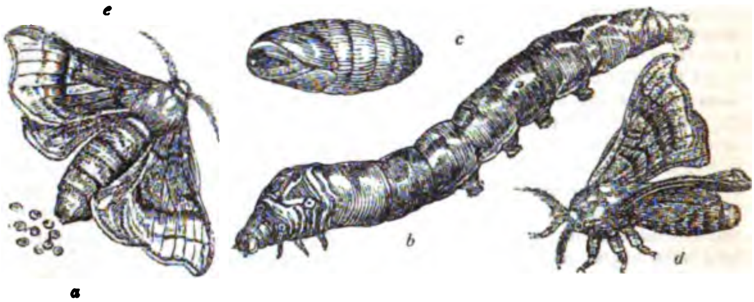
Properties and Uses. The bark, and more especially the leaves, of the white mulberry abound in a milky juice, which is found to have more or less of the properties of caoutchouc, according to the climate in which the tree is grown. It is thought by many to be owing to this property in the leaves of the mulberry that the cocoons of the silkworm have so much more tenacity of fibre than those of any other insect that feeds on the leaves of trees. Hence, also, the silk, like the tobacco and the wine, of warm climates, and of poor dry soils, is always superior to that produced in colder climates, and from rich and moist soils. The fruit of some of the varieties, particularly of *M.* a. multicaúlis, is used for making robs and syrups; and is said to be remarkably good to eat; for which reason this variety, in warm climates, might be introduced into orchards. The bark, according to Rosier, may be converted into linen of the fineness of silk. "For this purpose, the young wood is gathered in August, during the ascent of the second sap, and immersed for three or four days in still water. It is then taken out, at sunset, spread on the grass, and returned to the water at sunrise. This is daily repeated; and, finally, it is prepared, and spun like flax." (*Amer. Silk-Grow. Guide*, p. 24.) The bark is also used, like that of the lime tree, for making bast for mats. The wood weighs only 44 lb. per cubic foot: that of the branches is used for vine props, posts and rails, and fire-wood; and that of the trunk for making wine casks, for which it is highly valued, as it is said to impart an agreeable violet-like flavour to white wines. (*Dict. des Eaux et Forêts*, &c.) By far the most important use of the white mulberry, however, is as food for the silk-moth; and this subject we shall here notice under two heads; viz. that of the management of the trees and leaves, and the management of the insects.

Mulberry Plantations. In India and China, these are made much in the same manner as those of the sugar-cane, and other agricultural plants. A field is laid out into squares of 5 ft. or 6 ft. on the sides; and in the centre of each square a hollow is formed; the soil stirred and manured; and five or six mulberry cuttings inserted in a group in the centre. These plants are never allowed to grow higher than 3 ft. or 4 ft.; being cut down to the ground every year, in the same manner as a raspberry plantation. In the south of Europe, the white mulberry is grown in plantations by itself, like willows and fruit trees; also in hedgerows, and as hedges; but in all cases the plants are kept low, for the convenience of gathering the leaves without injuring the trees; the greatest height they are suffered to attain being that of a pollard of 6 ft., which is annually lopped. In Guernsey, and the north of France, and also in some parts of Italy, the mulberry is chiefly grown as a hedgerow pollard, or as a pollard by the road side, in the same manner as fruit trees. (See p. 886.) The leaves of the mulberry should be gathered for feeding the silkworms, when perfectly dry, after the dew has disappeared in the morning. The person employed to gather them strips them off upwards, and deposits them in a bag kept open with a hoop, and provided with a loop and strap to pass over his shoulder. When the leaves are gathered, the trees must be stripped entirely of every leaf; as this is found not to injure the tree half so much as if only part of the leaves were taken off. In America, the operation of stripping off the leaves is often repeated a second time the same year; but, in France and Italy, the tree is very rarely subjected to so severe a trial. When labour is sufficiently cheap, the leaves are best cut off with a pair of scissors. After the first stripping, the white mulberry and all its varieties are very soon again covered with leaves; and, if all the leaves were removed at once, the tree does not appear to have been at all injured by the operation; but, if any leaves were left on, the tree will be found to have received a severe shock. According

to Count Dandolo, a hundred trees, great and small, will furnish 7,000 lb. of leaves, and these will be sufficient for 200,000 silkworms.

Management of the Silkworm. The silkworm is the popular name for the larva, or caterpillar, of the moth known to entomologists as the *Bómbyx mòri Fab.*; a native of China, which was introduced into Europe, as we have before seen, in 550. *Fig.* 1224. represents this insect, in its various stages,

1224



of the natural size: *a*, the eggs, which, when good, are of a pale slate or dark lilac colour; *b* is the larva, or caterpillar, when full grown; *c* is the insect in its chrysalis state, after the silk has been removed; *d* is the male imago, or perfect insect; and *e*, the female. When full grown, the larva is nearly 3 in. long, of a yellowish grey colour, with a horn-like process on the last joint of the body. The eggs, in Britain, may be purchased in Covent Garden Market, at 10s. per oz.; and care should be taken that they are of the proper colour; because those that are of a pale yellow colour are imperfect. They are preserved in a cool place, that is, in a temperature of from 10° to 12° Réaumur (55° to 59° Fahr.), till wanted for use, and will retain their vitality upwards of a year. To hatch them, a temperature of 86° Fahr. is required; for which purpose, in most parts of Europe where the silkworm is cultivated, the rooms used for that purpose are heated by stoves; though in the East Indies, in the Islands of France and Bourbon, &c., and in the southern parts of the United States, the natural temperature of the air is found sufficient. The houses in which the insects are kept are built with numerous windows, for the admission of air; and furnished with tables or shelves, on which the insects are kept. These shelves have movable ledges, of 1 in. or more in height, on each side, to confine the insects; and several stages of them may be formed one above the other, if care be taken that they are not attached to the wall, in order to admit a free circulation of air on every side. When the mulberry begins to unfold its leaves, it is time to commence the hatching of the eggs. These should be placed on the shelves in the temperature mentioned; and when they begin to turn white, which will be in about ten days, they should be covered with sheets of writing paper, turned up at the edges, and pierced full of holes with a large knitting needle. On the upper side of the paper should be laid some young twigs of mulberry, which the insects will smell; and, crawling through the holes in the paper, will begin to eat as soon as they are hatched. As fast as these twigs become covered with insects, they are carefully taken up and removed to another shelf, where they are placed on whity-brown or any absorbent paper, about one to every square inch. The silkworm changes its skin four times before it spins its cocoon. Its life is thus divided into five ages; during the first of which it is fed with chopped or young leaves, fresh ones being given as soon as it has eaten what it had before. At this time it frequently appears to sleep, when it should on no account be disturbed. When the silkworm is in its second age, it may be fed with young leaves entire, or old ones chopped small; a great part of this age also is passed in sleep. During the third age the silkworms become more lively and vigorous, and they will devour full-grown leaves without cutting. In the fourth age the silkworm changes to a flesh colour, and eats greedily. In the fifth age the silkworm will eat the coarsest leaves, and it should be fed abundantly night and day, and have plenty of air and warmth. Each change is preceded by a day or two's apparent sickness and want of appetite in the insect, which becomes torpid before the change of its skin takes place. During the whole period of the silkworm's life, the litter made by the waste leaves, &c., must be frequently removed, the insects being attracted to one corner of their shelves with some fresh leaves, while the other parts are cleaned. When the caterpillars cease to eat, and run to and fro, frequently looking up, it is an indication that they are preparing to make their cocoons. They will now have become transparent, of a clear pearly colour, and the green circles round their bodies will have assumed a golden hue. Twigs of oak, tufts of dandelion, rolled up shavings from the cabinet-maker, cornets of paper, or sprigs of alaternus, phillyrea, heath, or broom, as may be most convenient, are then placed on the tables or shelves, to serve as a support for the insects; the tables or shelves having been previously cleared of all litter, and the branches, or other materials, having been so arranged as to give the insects a feeling of security. They then immediately begin to make their cocoons, which are exuded in threads from the mouth, and which are generally completed in from four to seven days. When the insects have done working, the cocoons are taken from the twigs, and sorted: those that are double, or in any way imperfect, are thrown aside; a certain number are selected to breed from, and the rest are set apart for reeling the silk. The first operation with these last is to kill the insects enclosed. This is performed, in Italy, by exposing the cocoons to the heat of the sun for three days, from 10 o'clock A. M. to 5 o' clock P. M., when the thermometer stands at 88° Fahr. In France they are put into bags or baskets, and enclosed for half an hour in ovens heated to 88°; but in America they are generally placed in sieves or boxes, having perforated bottoms; these are covered very closely with a woollen cloth, and then placed over the steam either of boiling water, or boiling whiskey or rum. (See *New York Farm.*, vol. vi. p. 227.) The insects being killed, and the cocoons cleared of the external floss (which is manufactured under the name of floss, or spun, silk), they are thrown by handfuls into basins of pure soft water, placed over small furnaces of charcoal fires. When the water is almost at the boiling point, the cocoons are sunk with a whisk of broom or peeled birch under water for two or three minutes, to soften the gum and loosen the fibre. This, however, is unnecessary when they have been killed by the steam of boiling

spirits, the gum having been dissolved by the spirit. The whisk is then moved lightly about till the filaments adhere to it, and are drawn off. As soon as a sufficient number are collected, the reeling begins. (See *Amer. Silk-Grower's Guide*, *Murray on the Silkworm*; *Nouv. Cours d'Agric.*, &c.) If well fed, in a proper temperature, the caterpillars will have finished their labours in 24 days from the period of being hatched; and the quantity of silk produced will, other circumstances being equal, be in proportion to the quantity of food devoured: its quality will depend on the climate and soil in which the leaves have been grown. An ounce of eggs will produce about 40,000 caterpillars, which will consume 1073 lb. of leaves, and produce 80 lb. of cocoons, or about 8 lb. of raw silk. The worms are subject to numerous diseases, the most fatal of which is vulgarly called the tripes; and is brought on by wet or improper food. When any insects appear sick, they should be immediately removed from the rest, as all their diseases appear to be contagious. Wet leaves should never be given to silkworms, as they occasion disease; and it is better to let the insects fast for 24 hours, or even longer, than to give them leaves that are not perfectly dry. In wet weather, the branches of the tree should be gathered, and hung up in a dry place; or the leaves should be gathered, and spread out to dry. (*Nouv. Cours d'Agric.*, vol. xvi. p. 103.)

Substitutes for Mulberry Leaves in feeding the Silkworm. It is probable that the leaves of all the plants that contain a milky juice will, if they are eligible in point of texture, afford suitable food for the silkworm, from the common property of milky juice, that of containing caoutchouc. Accordingly, trials have been made with the tender leaves of the fig, with the leaves of the maclura, and of *A'cer* platanöides and *A.* tatáricum, among trees; and of lettuce, endive, beet, spinach, nettle, &c., among herbaceous plants. None of these substitutes, however, are of any real use, unless we except the maclura and the lettuce. The former, according to the *American Gardener's Magazine*, is thought likely to answer to a certain extent; as the lettuce and endive have done formerly, more especially when the plants have been allowed to send up their flower stalks before their leaves were gathered. In 1792, a Miss Croft of York sent a specimen of silk of her own raising to the Society of Arts, the worms producing which had been fed entirely on lettuce leaves.

Soil, Situation, Propagation, and Culture. The white mulberry is more tender than *Mòrus* nìgra, and requires more care in choosing a situation for it. Calcareous soil is said to produce the best silk; and humid situations, or where the roots of the tree can have access to water, the worst. A gravelly or sandy loam is very suitable; and trees grown on hilly surfaces, and poor soils, always produce superior silk to those grown in valleys, and in rich soils. The tree is propagated by seeds, cuttings, layers, and grafting. To obtain seeds, the berries must be collected from trees which have been known to produce male catkins the preceding spring. The berries are either gathered when quite ripe, and left to become dry before the seed is separated from them; or they are put into water as soon as gathered, and rubbed so as to separate the seeds, which are cleansed from the pulp in the water, and then rubbed dry on a linen cloth, and either sown immediately, or mixed with sand, and kept till wanted for use. In the south of France, the seeds are sown as soon as the fruit is gathered, and the plants come up the same autumn; but, in colder climates, they are kept till spring, when they generally come up in three or four weeks, and require some protection, at first, during cold nights. In Germany, and in the north of the United States, the young plants are covered, during the first winter, with dry leaves or straw; and this covering, or mulching, is continued on the ground for three or four years, till the plants are thoroughly established, to protect their roots from the cold. The young plants are generally taken up and replanted the second spring, care being taken to place them in rows 4 ft. asunder, for the convenience of gathering the leaves. *M.* a. multicaúlis is always propagated by layers or cuttings; the layers being made in spring or at midsummer, and separated from the mother plant in autumn; or by cuttings of branches, or truncheons, which will root readily, and produce leaves for the worms the following year. Count Dandolo recommends grafting the species with the large-leaved varieties, near the ground, the third spring; but most writers on the silkworm appear to prefer seedling plants, or plants raised from layers or cuttings, to grafted ones. In pruning, cutting in, or heading down, the trees, the great object is to preserve the equilibrium of the heads, so that the sap may be equally distributed through the branches on every side. On this depends the production of a crop of leaves of equal quality on every part of the tree, which is alike important both for the first crop, which is given to the worms, and for the second crop, which is required for the nourishment of the tree.

Insects and Diseases. The leaves of the white mulberry are eaten by no insect but the silkworm: it is, however, attacked by numerous diseases, partly, no doubt, occasioned by the unnatural manner in which it is treated, by being stripped of its leaves. One of these diseases is brought on by any sudden

check given to the transpiration of the leaves, which turn yellow, and fall off, the tree dying in a few days. Another is the death of the roots, from the formation on them of a parasitic fungus. In both cases, nothing is to be done, but to remove the tree, and replant. The leaves are also apt to be attacked with honey-dew, mildew, rust, and other diseases, which render them unfit for the food of the silkworm. The leaves covered with honey-dew may be washed, and, when thoroughly dry, given to the insects without injury; but the other diseased leaves should be thrown away. If leaves covered with honey-dew are given to silkworms without washing, they cause dysentery and death.

Statistics. The largest white mulberry trees in England are at Syon, where there is one 45 ft. high; diameter of the trunk 1 ft. 10 in., and of the head 59 ft.; and which is covered with fruit every year. At Kenwood is one, 38 years planted, which is 33 ft. high; diameter of the trunk 1 ft. 1 in., and of the head 28 ft. In Hertfordshire, at Cheshunt, 7 years planted, it is 10 ft. high; diameter of the trunk 2 in., and of the head 6 ft. In Oxfordshire, in the Oxford Botanic Garden, 20 years planted, it is 20 ft. high; diameter of the trunk 9 in., and of the head 20 ft. In Suffolk, at Ampton Hall, 9 years planted, it is 9 ft. high; diameter of the trunk 2 in., and of the head 5 ft. In Worcestershire, at Croome, 35 years planted, it is 40 ft. high; diameter of the trunk 12 in., and of the head 40 ft. In Scotland, in Forfarshire, at Airlie Castle, 8 years planted, it is 8 ft. high; in Perthshire, at Kinfauns Castle, 8 years planted, it is 5 ft. high; in Ross-shire, at Brahan Castle, 25 years planted, it is 10 ft. high. In Ireland, at Terenure, near Dublin, 8 years planted, it is 6 ft. high. In France, in the Jardin des Plantes, 35 years planted, it is 32 ft. high, the diameter of the trunk 1 ft., and of the head 36 ft.; in the Botanic Garden, Toulon, 30 years old, it has a trunk 2 ft. 7 in. in circumference. In Saxony, at Wörlitz, 50 years old, it is 40 ft. high, with a trunk 2½ ft. in diameter. In Austria, at Vienna, in the University Botanic Garden, 30 years planted, it is 45 ft. high, the diameter of the trunk 1 ft., and of the head 24 ft.; in Rosenthal's Nursery, 18 years old, it is 30 ft. high, the diameter of the trunk 4 in., and of the head 25 ft.; at Hadersdorf, 30 years old, it is 18 ft. high, diameter of the trunk 10 in., and of the head 2 ft.; at Brück on the Leytha, 27 years planted, it is 30 ft. high; the diameter of the trunk 8 in., and of the head 12 ft. In Prussia, at Berlin, at Sans Souci, 25 years old, it is 9 ft. high; the diameter of the trunk 3 in. In Denmark, at Rosenberg, near Copenhagen, 10 years planted, it is 10 ft. high. In Sweden, at Lund, in the Botanic Garden, it is 18 ft. high, with a trunk 5½ in. in diameter. In Italy, at Monza, 200 years old, it is 40 ft. high, the diameter of the trunk is 3 ft., and of the head 50 ft.

Commercial Statistics. Price of plants, in the London nurseries, from 1*s.* 6*d.* to 2*s.* 6*d.* each: at Bollwyller, plants three years old, and transplanted, are 10*s.* per thousand; two years old, 5*s.* per thousand: at New York, single plants are 37½ cents; and *M.* a. multicaúlis is from 25 to 30 dollars per hundred, according to the size of the plants.

The best works on the culture of the white mulberry and the silkworm are, Dandolo's *Dell' Arte di governare i Bacchi da Seta*, Milan; Castelet's *Traité sur le Mûrier blanc*, Paris: Grognier's *Recherches Historiques et Statisques sur le Mûrier, le Ver à Soie, et la Fabrication de la Soierie*, &c., Lyons; Bonafous's *Mémoire sur une Education de Vers à Soie*, &c., Paris; Kenrick's *American Silk-Grower's Guide*, Boston; Cobb's *Manual of the Mulberry Tree*, &c., Massachusetts; Dr. Pascalis's *Treatise on the Mulberry*, &c., New York; and Murray's *Observations on the Silkworm*, London.

♀ 3. *M.* (A.) CONSTANTINOPOLITA'NA *Poir.* The Constantinople Mulberry Tree.

Identification. Poir. Encyc., 4. p. 381.; Spreng. Syst. Vég., 1. p. 492.
Synonyme. *M.* byzantina *Sieb.*
Engraving. N. Du Ham., 4. t. 24.

Spec. Char., &c. Leaves broadly ovate, heart-shaped at the base, undivided, serrate, 3-nerved; glabrous on both surfaces, except at the axils of the veins on the under one, where they are villous. Male flowers in fascicles. (*Spreng. Syst. Vég.*, i. p. 492.) This is a low branching tree, seldom exceeding the height of 10 ft. or 15 ft.; a native of Turkey, Greece, and Crete; which has been long cultivated in the Jardin des Plantes, but which was not introduced into England till 1818. The fruit is short, thick, and, according to Du Hamel, of a deep red, and insipid taste. The leaves are very good for silkworms. This alleged species is considered as only a variety of *M.* álba by Bosc (*Nouv. Cours d'Agric.*, ix.); who says that it is easily recognised by its rough, furrowed, stunted trunk; its thick and short branches; its leaves, which are always entire; and its solitary very white fruit. It is, he adds, a real monster (un véritable monstre, mais qui se propage toujours le même). We have little doubt of its being only a variety of *M.* álba. Du Hamel's description and that of Bosc agree in every particular, except the colour of the fruit. According to M. Madiot, in the *Journal de la Société d'Agriculture Pratique*, *M.* a. pùmila (p. 1350.) was obtained from seeds of *M.* (a.) constantinopolitàna. Plants of *M.* constantinopolitàna, in the Bollwyller Nursery, are 3 francs each; at New York, 50 cents.

♀ 4. *M.* (A.) TATA'RICA *Pal.* The Tartarian Mulberry Tree.

Identification. Pall. Fl. Ross., 2. p. 9. t. 52.; Lin. Sp. Pl., 1399.; Mill. Dict., No. 7.; Willd. Sp. Pl., 4. p. 369.
Engravings. Pall. Fl. Ross., 2. t. 52.; and our *fig.* 1225.; both sprigs taken from one tree.

Spec. Char., &c. Leaves with a shallow scallop at the base, and either heart-shaped, ovate, or lobed; serrated with equal teeth, smooth; the pro-



1225

jecting portions beside the sinus equal. Very closely akin to *M.* álba *L.*, and, perhaps, originally produced from that species. It inhabits places inundated by the waters of the rivers Wolga and Tanais, or Don. (*Willd. Spec. Pl.*, iv. p. 369.) A deciduous tree, growing to the height of 20 ft.; and introduced in 1784. In the *American Silk-Grower's Guide*, it is stated that the fruit is black, and resembles that of *M.* nigra. Gerber, also, says that it is black. "Pallas speaks of it as reddish or pale, of no good flavour, though it is eaten raw in Tartary, as well as dried, or made into a sweetmeat. A wine is also prepared from it, and a very well-flavoured spirit. This species is reported to be most esteemed for silkworms in China." (*Smith* in *Rees's Cyclopædia.*) In America, *M.* tatárica is considered to make the finest silk. According to a writer in the *Annales de Fromont*, the *M.* tatárica is, as we have already observed (p. 1349.), nearly related to *M.* a. multicaúlis. From the trees, or rather large shrubs, bearing this name in the Kew Garden, we confess our inability to fix on any permanent distinction between them and *M.* álba, as far as the leaves are concerned: the fruit we have never seen. Plants, in the London nurseries, are 2*s.* 6*d.* each; at Bollwyller, 1 franc 50 cents; at New York, 75 cents.

♀ 5. *M.* RU'BRA *L.* The red-*fruited* Mulberry Tree.

Identification. Lin. Sp. Pl., 1399.; Mill. Dict., No. 4.; Willd. Arb., 197.; Michx. Fl. Bor. Amer., 2. p. 179.; Pursh Fl. Amer. Sept., 2. p. 639.; Wangenh. Amer., p. 37. t. 15. f. 35.; Nutt. Gen. N. Amer. Pl.; Willd. Sp. Pl., 4. p. 369.; N. Du Ham., 4. p. 91.
Synonymes. *M.* virgínica *Pluk. Alm.*, p. 253., *Du Ham. Arb.*, 2. p. 24.; *M.* pennsylvánica *Nois. Arb. Fruit.*, *Lodd. Cat.*, edit. 1836.
Engravings. Wangenh. Amer., t. 15. f. 35.; Pluk. Alm., t. 246. f. 4.; and the plate in our last Volume.

Spec. Char., &c. Sexes polygamous. (*Kalm Act. Suec.*, 1776.) Sexes diœcious. (*Gronov. Virg.*, 146.) Spikes of female flowers cylindrical. Catkins [? of male flowers] of the length of those of the common birch (*Bétula* álba *L.*). Leaves heart-shaped, ovate, acuminate, 3-lobed, or palmate; serrated with equal teeth, rough, somewhat villous; under surface very tomentose, and, in consequence, soft. (*Willd. Sp. Pl.*) A tree, a native of North America, from Canada to Florida; varying in height from 40 ft. to 70 ft. "Cultivated here, according to Parkinson's *Paradisus*, p. 596., early in the seventeenth century. He says, it grows quickly with us to a large tree, and that the fruit is long, red, and pleasantly tasted." (*Smith* in *Rees's Cyclopædia.*) It flowers in July. This tree is named *M.* pennsylvánica in the Horticultural Society's Garden, and in Loddiges's arboretum. It appears very distinct from any of the preceding sorts, in the spreading umbelliferous appearance of the branches, the flat, heart-shaped, very rough-surfaced leaves, which are almost always entire, but which, nevertheless, are occasionally found as much lobed and cut as those of any other of the genus. This we witnessed in September, 1836, in the specimen tree in the Hackney arboretum.

Description, &c. *M.* rùbra attains by far a greater size, as a tree, than any other species of *Mòrus*. It is seldom found, in a wild state, less than 40 ft. in height; and, in some parts of Pennsylvania and Virginia, it is often 60 ft. or 70 ft. high, or more, and with a trunk 2 ft. and upwards in diameter. The "leaves are large, sometimes entire, and sometimes divided into 2 or 3

lobes; rounded, cordiform, and denticulated; of a dark green colour, a thick texture, and a rough uneven surface." (*Michx. Syl. Amer.*, iii. p. 51.) They are the worst of all the kinds of mulberry leaves for feeding silkworms. The fruit is of a deep red colour, an oblong form, and an agreeable, acidulous, sugary taste. The trunk of the red mulberry is covered with a greenish bark, more furrowed than that of the oaks and hickories. The perfect wood (which is fine-grained and compact, though light,) is of a yellowish hue, approaching to lemon colour. "It possesses strength and solidity; and, when perfectly seasoned, it is almost as durable as that of the locust, to which, by many persons, it is esteemed equal." (*Michx.*) It, however, grows more slowly, and requires a richer soil, it being generally found in valleys, at a distance from the sea. It is a common opinion among shipwrights and carpenters, that the wood of the male mulberry is more durable, and of a better quality, than that of the female; but Michaux does not appear to credit this supposition; which, indeed, evidently cannot be depended on, as the male and female flowers are very often found on the same tree. The red mulberry is well deserving of cultivation as an ornamental tree, from its thick and shady foliage; and as a fruit tree, from the agreeable flavour of its fruit. Miller mentions a plant of this species in the garden of Fulham Palace, which, in 1731, had been there for several years without producing any fruit; but which, at some seasons, produced a great number of catkins, much like those of the hazel nut; which occasioned Ray to give it the name of Córylus. (*Dict.*, ed. 1.) On enquiring for this tree in 1834, we found nothing known about it. It is generally said that no insect feeds on the mulberry but the silkworm. In Smith and Abbott's work on the insects of Georgia, however, a specimen is given of the red mulberry, with the small ermine moth (Phalæ'na punctatíssima) feeding on it. (See *Insects of Georgia*, vol. ii. t. 70.)

? Variety.

 ♀ M. *canadénsis* Lam. Dict., iv. p. 380., seems to be a variety of *M.* rùbra. (*Smith* in *Rees's Cyclopædia.*)

Statistics. In the environs of London, almost the only plants that we know are those mentioned as in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges; the latter being 8 ft. or 10 ft. high, and the former 16 ft. high. In Durham, at Southend, 30 years planted, it is 20 ft. high, against a wall; diameter of trunk 12 in., and of the head 21 ft. not trained. In Oxfordshire, in the Oxford Botanic Garden, 40 years old, it is 12 ft. high against a wall; diameter of the trunk 10 in., and of the head 30 ft. In France, in the Jardin des Plantes, 50 years planted, it is 45 ft. high; the diameter of the trunk 1½ ft., and that of the head 38 ft. In Italy, at Monza, 60 years old, it is 26 ft. high; the diameter of the trunk 2 ft., and of the head 30 ft.

Commercial Statistics. Price of plants, in London, 2*s*. each; at Bollwyller, francs; at New York, 37½ cents.

♀ 6. *M.* (R.) SCA'BRA *Willd.* The rough-*leaved* Mulberry Tree.

Identification. Willd.; Spreng. Syst. Veget., 1. p. 492.; Nutt. Gen. N. Amer. Pl.; Lodd. Cat., ed. 1836.

Synonyme. *M.* canadénsis *Poir.*

Spec. Char., &c. Leaves rough on both surfaces, heart-shaped, 5-cleft; the lobes acuminated to the tip, tapered to the base, and serrated with equal teeth. A native of North America. (*Spreng. Syst. Veg.*) A tree, growing to the height of 20 ft. Introduced in 1817; and, from the appearance of the plant bearing this name in the Horticultural Society's Garden (which, in 1836, was 8 ft. high), doubtless only a variety of, or possibly identical with, *M.* rùbra.

App. i. *Half-hardy Species of* Mòrus.

M. *índica* L. is near *M.* álba; but its leaves are not heart-shaped at the base. (*Willdenow Sp. Pl.*) This name occurs in Mr. Royle's list (see p. 175.). "Rumphius says that the fruit is delicately flavoured, and black when ripe; and that the Chinese feed their silkworms with the leaves. Loureiro mentions the same practice of the inhabitants of Cochin-China, who replant the tree every year, that the foliage may be tender." (*Smith* in *Rees's Cyclopædia.*)

M. *mauritiàna* Jacq. has the leaves oblong, entire, tapered to both ends, and rough. The leaves of young plants are fiddle-shaped. (*Willdenow Sp. Pl.*) "A large and strong tree. Fruit green, sweet, with some acidity; 1½ in. or 2 in. long. The French call this tree la râpe, or the rasp tree of Ma-

dagascar. The leaves seem calculated to serve as a fine file or rasp, like those of some of the fig kind. It is a most distinct species, and ought to have been named *M. laurifòlia* or *M. citrifòlia*." (*Smith* in *Rees's Cyclop.*) This name is also in the list derived from Mr. Royle.

M. *latifòlia* Willd. is a native of the Isle of Bourbon. Its leaves are ovate, heart-shaped at the base, serrate; the disk 4 in. long, 3 in. broad, scabrous, reticulately veined; the petiole 1 in. long. (*Willdenow Sp. Pl.*)

M. *austràlis* Willd. is a native of the Isle of Bourbon. It has ovate, serrated, rough leaves; and the styles bearded, even when persistent in the fruit. (*Willd.*)

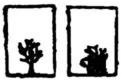
M. *celtidifòlia* Thunb. is a native of Quito. Its leaves are ovate-oblong, acuminate, undivided, sharply serrated, 3 nerved; roughish above, glabrous beneath. (*Spreng. Syst. Vég.*, i. p. 492.)

M. *corylifòlia* Thunb. is a native of Quito. Its leaves are roundish ovate, acuminate, sharply serrate, 3-nerved, glabrous. (*Spreng.*, l. c.)

M. *càlcar-gálli* Cum. is a native of New South Wales, where it is called the yellow wood vine. This "is a shrub which extends itself to a great length, and may eventually prove to be long to the genus Maclùra."

M. *átro-purpùrea*; M. *parvifòlia*; M. *serràta*, syn. M. *heterophýlla*; M. *lævigàta víridis*; and M. *scándens*; are Nepal kinds, of which very little is known. (See p. 174.)

GENUS II.



BROUSSONE`*TIA* Vent. THE BROUSSONETIA. *Lin. Syst.* Diœ`cia Tetrándria.

Identification. Vent. Tabl. du Règne Végét., 3. p. 547.; Willd. Sp. Pl., 4. p. 743.; Lindl. Nat. Syst. of Bot., p. 178.
Synonymes. Mòrus Sèba Kæmpf., Lin.; Papýrus *Encyc. Bot.*, 5. p. 5., *Lam. Ill. Gen.*, t. 762.
Derivation. Named in honour of *P. N. V. Broussonet*, a French naturalist, who wrote numerous works on natural history.

■ 1. B. PAPYRI′FERA *Vent.* The paper-bearing Broussonetia, *or Paper Mulberry.*

Identification. Vent. Tabl. du Règne Vegét., 3. p. 547.; Willd. Sp. Pl., 4. p. 743.
Synonymes. Mòrus papyrifera *Lin. Sp. Pl.*, 1399., *Mill. Dict.*, No. 6., *Du Roi Harbk.*, 1. p. 433., *Thunb. Fl. Jap.*, 72.
The Sexes. Both the male and female plants are in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges.
Engravings. Kæmpf. Amœn., t. 472.; Hist. du Japon, t. 40. f. 1.; Seba Thesaur., 1. t. 28.; Lam. Ill. Gen., t. 762.; N. Du Ham., 2. t. 7.; and the plate in our last Volume.

Variety.

■ *B. p.* 2 *cucullàta*; B. cucullàta *Bon Jard.*, 1833, p. 919.; B. spatulàta *Hort. Brit.*; B. naviculàris *Lodd. Cat.*, ed. 1836.—A sport, found on a male plant by M. Camuset, foreman of the nursery, in the Jardin des Plantes; which has its leaves curved upwards, like the hood of a Capuchin, or the sides of a boat. It is propagated by grafting, and may be had in most of the Paris and London nurseries.

Description, &c. A deciduous low tree or large shrub, a native of China and Japan, and of the South Sea Islands; which so closely resembles the mulberry, that it was long considered to belong to that genus, and still retains its English name of the paper mulberry. It was introduced in 1751, and flowers in April, ripening its fruit in the climate of London, in autumn. Its leaves are large, hairy, and canescent; and either heart-shaped, or cut into deep irregular lobes. The fruit is oblong, of a dark scarlet colour when ripe, and of a sweetish, but rather insipid, taste. The tree is perfectly hardy; but, from the extreme brittleness of its wood, it is very liable to be broken by high winds. The wood is soft, spongy, and of no value, except for fire-wood. The leaves are too rough and coarse in their texture for silkworms; but they are found excellent for cattle; and, as the tree will grow rapidly in almost any soil, and throws out numerous tufts of leaves, it might be valuable in some situations and climates, as fodder. The principal use, however, to which the Broussonetia appears capable of being applied is for the paper that may be made from its bark. The following is an abridgment of Kæmpfer's account of the mode of preparing this paper in Japan, as quoted in the *Penny Cyclopædia*, vol. v. p. 472.:—"The branches of the current year, being cut into pieces about a yard long, are boiled till the bark shrinks from the wood, which is taken out and thrown away; and the bark, being dried, is preserved till wanted.

In order to make paper, it is soaked for three or four hours in water; after which the external skin, and the green internal coat, are scraped off, and the strongest and firmest pieces are selected; the produce of the younger shoots being of an inferior quality. If any very old portions present themselves, they are, on the other hand, rejected as too coarse. All knotty parts, and every thing which might impair the beauty of the paper, are also removed. The chosen bark is boiled in a lixivium till its downy fibres can be separated by a touch of the finger. The pulp so produced is then agitated in water till it resembles tufts of tow. If not sufficiently boiled, the paper will be coarse, though strong; if too much, it will be white, indeed, but deficient in strength and solidity. Upon the various degrees and modes of washing the pulp, much also depends as to the quality and beauty of the paper. Mucilage obtained from boiling rice, or from a root called oreni (*Kæmpf.*, 474.), one of the mallow tribe, is afterwards added to the pulp. The paper is finished much after the European mode, except that stalks of rushes are used instead of brass wires." (*Pen. Cyc.*, art. Broussonètia) The India or Chinese paper used for taking proofs of engravings is thus made. In Otaheite, the bark of this tree is made into dresses. Plants are readily propagated by layers, suckers, or cuttings of the root.

Statistics. In the environs of London, the largest plant we know of is in the Botanic Garden at Kew, where it is 20 ft. high. In Berkshire, at White Knights, 25 years planted, it is 23 ft. high; the diameter of the trunk 9½ in., and of the head 20 ft. by 13 ft. In Cheshire, at Eaton Hall, 10 years planted, it is 8 ft. high; diameter of the trunk 3 in., and of the head 7 ft. In Oxfordshire, in the Oxford Botanic Garden, 14 years planted, it is 25 ft. high; diameter of the trunk 4 in., and of the head 15 ft. In Worcestershire, at Croome, 40 years old, it is 20 ft. high; diameter of the trunk 12 in. In Scotland, in Perthshire, at Kinfauns Castle, 8 years planted, it is 5 ft. high. In France, at Villers le Bacle, 10 years planted, it is 25 ft. high. In the Botanic Garden, Toulon, 20 years planted, it is 25 ft. high; and the diameter of the trunk is 1 ft. 2 in.; at Nantes, in the nursery of M. De Nerrières, 30 years planted, it is 25 ft. high: in the Botanic Garden at Avranches, 40 years planted, it is 40 ft. high; the diameter of the trunk 2 ft. 7½ in., and of the head 30 ft. In Austria, at Vienna, in the University Botanic Garden, 20 years planted, it is 22 ft. high; the diameter of the trunk 9 in., and of the head 10 ft.: at Laxenburg, 20 years planted, it is 14 ft. high; the diameter of the trunk 4 in., and of the head 6 ft.: at Hadersdorf, 6 years planted, it is 14 ft. high. In Italy, at Monza, 24 years planted, it is 40 ft. high; the diameter of the trunk 1 ft., and of the head 20 ft.

Commercial Statistics. Plants, in the London nurseries, are from 1*s* 6*d*. to 2*s*. 6*d*. each; at Bollwyller, 1 franc each; and at New York, the male plant 50 cents each, and the female plant 75 cents.

Genus III.

MACLU'RA Nutt. The Maclura. *Lin. Syst.* Diœ'cia Tetrándria.

Identification. Nutt. Gen. N. Amer. Plants, 2. p. 233.; Lindl. Nat. Syst. of Bot., p. 178.
Synonyme. Tóxylon *Rafinesque* in 1817, *Gard. Mag.*, vol. viii. p. 247.
Derivation. Named, by Nuttall, in honour of *William Maclure*, Esq., of the United States; an eminent natural philosopher.

♀ 1. M. AURANTI'ACA *Nutt.* The orange-like-*fruited* Maclura, *or Osage Orange.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 234.
Synonymes. Bow-wood, Yellow Wood, *N. Amer.*
The Sexes. Both male and female plants are in the Horticultural Society's Garden, and in the Hackney arboretum.
Engravings. Appendix to Lambert's Monog. on the Genus Pinus, 2. p. 32.; and our *fig.* 1226., in which *a* is the female flower, and *b* the male.

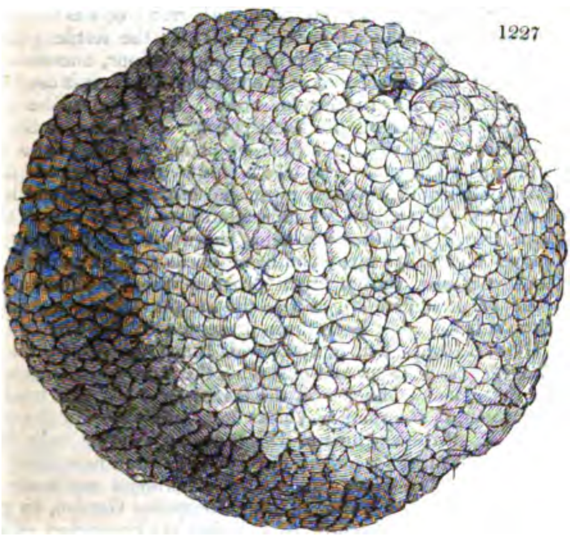
Description, &c. The maclura is a deciduous widely spreading tree, with spiny branches, growing to the height of about 30 ft., on the banks of the Red River; or, according to Nuttall, of 60 ft., in the Arkansas. The leaves are ovate acuminate, of a bright shining green, broad, with a cuspidate point, 3 in. or 3½ in. long, and about 2 in. broad. The petiole is often 1 in. long. The spines are simple, rather strong, about 1 in. in length, and produced in the axils of the leaves. The flowers are inconspicuous, and nearly green, with a slight tinge of yellow. The fruit, which in size and general appearance, at a distance, resembles a large Seville orange, consists of radiating, somewhat



1226

woody fibres, terminating in a tuberculated surface, and contains numerous seeds (or nuts, as they are botanically termed), and a considerable quantity o sweetish milky fluid, which, when exposed to the action of the air, coagulates like milk. The sap of the young wood and leaves is also milky, and soon dries on exposure to the air. It is insoluble in water, and contains a large proportion of caoutchouc. This tree is found on the banks of the Red River, and in deep and fertile soil in the adjacent valley. The Arkansa appears to form its northern boundary. It was first introduced into the gardens of St. Louis, on the Mississippi, from a village of the Osage Indians; whence it obtained its popular name of the Osage orange. It was afterwards planted in the nursery of Mr. M'Mahon at Philadelphia, whose widow now carries on the business, and still possesses the original tree. About 1818, seeds were sent to England by M. Correa de Serra (See *Gard. Mag.*, i. p. 356.); and, subsequently, plants of both sexes were imported by the London nurserymen.

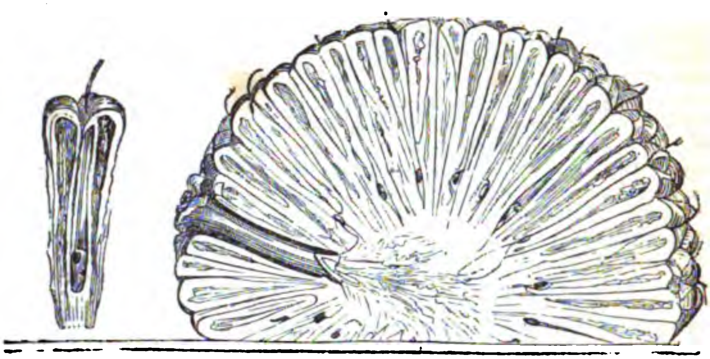
Properties and Uses. The fruit, when ripe, is of a golden colour, and on the tree has a splendid appearance; but, though eatable, it does not appear to be any where used for human food. M. Le Roy, nurseryman at Angers, informed us, in June, 1836, that he had tasted some of the fruit which had ripened at Lyons; and that it was scarcely so good as that of the *A'rbutus U'nedo.* Fruit has also been ripened at Clairvaux, near Chatellerault (*Recueil Indust.*, 2d ser., tom. ii. 1836, p. 50.); and at Montpelier. (See *Algemeine Garten-Zeitung*, Nos. 36. and 37., for September, 1836.) An Osage orange sent to us by Dr. Mease of Philadelphia, from Mrs. M'Mahon's Nursery, in Jan. 1830, (of which *fig.* 1227. is a view, and *fig.* 1228. a section; both of the natural



1227

size;) measured 9 in. round one way, and 9½ in. the other. It weighed 15 oz. when gathered. The colour was of a greenish yellow, and the taste insipid,

1228



but slightly acid. It did not appear half ripe when we received it; and it decayed without coming to maturity. We have since, at different times, received two other fruits, also from Dr. Mease; but perceived no difference between them and the one figured above. The seeds in the fruit last received appearing full, we distributed them; and young plants have been raised from them by M. Vilmorin of Paris; Mr. Gordon of the London Horticultural Society's arboretum; Mr. Campbell of the Botanic Garden, Manchester; and others. Mr. R. Buist, in the *American Gardener's Magazine*, vol. ii. p. 77., states that there are four trees in Mrs. M'Mahon's Nursery, Philadelphia, which were among the first introduced into that part of America. They are planted two and two, each pair being about 400 ft. apart. In 1831, it was discovered that one of these trees produced larger fruit than the others, and that this fruit contained perfect seeds. Two of the other trees produced smaller fruit, but the seeds they contained were abortive; while one of the trees was entirely barren. The next year, it was discovered that the barren tree was the male plant; and that the tree which produced perfect seeds was the fertile plant, which stood by its side. The wood is of a bright yellow colour, uncommonly fine-grained, and elastic; and, on account of the latter property, it is used by all the southern tribes of American Indians for bows. It is said to be extremely durable, and capable of receiving the finest polish. It resembles the wood of the Maclùr*a* tinctòria, or fustick tree (a stove plant, a native of the West Indies), in affording a yellow dye. The tree is said by the Americans to be very ornamental, not only from its general form, its shining foliage, and its golden orange-like fruit, but on account of its retaining its leaves longer than any other deciduous tree. The branches being thorny, it has been proposed by some to employ it as a hedge plant, and by others as a stock to the mulberry; and it has been suggested that it might prove a valuable substitute for, or auxiliary to, the *M*. a. multicaúlis, as food for the silkworm. A memorial to the latter effect, it is said, has lately been presented to the French Institute. (See *Amer. Gard. Mag.*, vol. i. p. 400.) M. Bonafous, visiting the Botanic Garden at Montpelier, in 1835, and observing the luxuriance with which the maclura grew there, had a number of the leaves gathered, and tried to feed silkworms with them, in the same way as is done with those of the mulberry. He gave the leaves of the maclura to 18 silkworms, as their only food, and they produced very beautiful cocoons; but it is not stated how these cocoons turned out when they were reeled. A second experiment was made in 1836, by M. Raffeneau De Lile, director of the Montpelier Garden, by giving 50 silkworms the leaves of the maclura only during the latter part of their existence. The worms were not fed on the maclura till the 19th of May, when they cast their second skins. These worms never seemed to eat the leaves greedily; but they increased in size as much as those that were fed on the

leaves of the mulberry. In the course of feeding, 15 silkworms wandered away or died; and, during the time of spinning, 20 more died, the latter becoming black, rotten, and reduced to a liquid. The cocoons were not ready till some days after those of the worms fed on mulberry leaves: only 5 of them were quite perfect, but several others were tolerably so; and from all these the silk was reeled easily, and was of excellent quality. Other experiments have been tried in Italy, but with still less favourable results. (*Otto's Garten Zeitung*, vol. iii. p. 292.) The tree is perfectly hardy about Philadelphia, and also in the climate of London; where, when cut down after having been two or three years established, it throws up shoots 6 ft. or 8 ft. in length, and nearly ½ in. in diameter, with fine, broad, shining, succulent leaves. Hitherto it has had no proper trial as a standard in England, having been originally considered tender, and planted against a wall; but we have no doubt it will, in time, become a valuable timber tree of the second rank. It is propagated with the greatest ease by cuttings of the roots, or by layers; and it will grow in any common soil.

Statistics. In the environs of London, the largest plant, as a standard, is a female tree in the Hammersmith Nursery, which is nearly 16 ft. high. In our garden at Bayswater, a female plant, against a wall, is about the same height. At Kew, one against a wall is 12 ft. high. In Staffordshire, at Blithefield, in 1834, it was 6 ft. high against a wall. In France, in the Jardin des Plantes, 10 years planted, it is 18 ft. high; in the nursery of M. Sidy, at Lyons, where it has fruited, it is 25 ft. high; at Villers la Bacle, 8 years planted, it is 15 ft. high; in the Botanic Garden at Toulon, 5 years planted, it is 12 ft. high. In Austria, at Brück on the Leytha, 10 years planted, it is 6 ft. high. In Italy, at Monza, the female tree, 6 years planted, was, in 1835, 16 ft. high, and fruited for the first time. In North America, at Philadelphia, the four largest trees are those mentioned as in Mrs. M'Mahon's Nursery; and there are also large trees in Landreth's Nursery, which, in 1831, "were full of fruit." In Virginia, at Beaverdam, a female tree, with a globular head, yielded, in 1835, 150 fruit, many of which weighed 18 oz. or 19 oz. each. (*Amer. Gard. Mag.*, 2. p. 9.)

Commercial Statistics. Plants, in the London nurseries, are 2*s.* each; at New York, female plants are 1 dollar, and male plants 2 dollars, each.

GENUS IV.

FI'CUS *Tourn.* THE FIG TREE. *Lin. Syst.* Polygàmia Diœ'cia.

Identification. Tourn.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. No. 6.; Willd. Sp. Pl., 4. p. 1131.; Lindl. Nat. Syst. of Bot., p. 178.
Synonymes. Figuier, *Fr.*; Feigenbaum, *Ger.*
Derivation. Some derive Fìcus from *foecundus*, on account of its abundant bearing; and others from *sukus* (Greek), or *fag* (Hebrew), the names for the fig tree in those languages. The fig tree has nearly the same name in all the European languages.

Description, &c. The species are all trees, natives of warm climates, and remarkable, in a popular point of view, for having their flowers concealed by the fleshy receptacle known as the fruit. The sycamore of Scripture (*Fìcus Sycómorus L.*) is a species of fig, a native of Egypt, where it is a timber tree exceeding the middle size, and bearing edible fruit. A large tree of this species is figured in the *Picture Bible*, vol. ii. p. 181, The only species which will endure the open air in Britain is the *F.* Cárica, or common garden fig. These two species are the only ones which produce eatable fruit. It is mentioned in the *Nouveau Du Hamel*, that the receptacle which forms the fruit of the fig is not always entire and connivent; but that there are some few sorts in which the fruit constantly opens when it approaches maturity; dividing ordinarily into four parts, which expand like the petals of a flower, to such an extent, that each division becomes perpendicular to the peduncle. The varieties which exhibit this singularity are called the Barnissotes and the Verdales. (*N. Du Ham.*, tom. iv. p. 198., note.)

1. *F.* CA'RICA *L.* The *common* Fig Tree.

Identification. Lin. Sp., 1513.; Willd. Sp., 4. p. 1131.; Lam. Dict., 2.; Mill. Ic., t. 73. p. 489.; N. D Ham., 4. p. 198.
Synonymes. *F.* commùnis *Bauh. Pin.*, 457.; *F.* hùmilis and *F.* sylvéstris *Tourn. Inst.*, 663.; Figuier commun, *Fr.*; Gemeine Feigenbaum, *Ger.*

Engravings. Mill. Ic., t. 73.; Lam. Ill., t. 861.; N. Du Ham., t. 53.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves palmate and subtrilobate; rough above, pubescent beneath. (*Willd.*) A low deciduous tree, a native of the East, cultivated in Britain from time immemorial; and ripening its fruit against walls, in the climate of London, in the month of September.

Varieties. Botanically, the common fig may be considered as existing in three different states: — 1. Wild, in which the leaves are comparatively small, and not much cut; and the fruit small, and sometimes blue and sometimes white. 2. Cultivated, with very large leaves, very deeply cut, such as the blue Ischia and the Brunswick fig, and other sorts; the fruit of some of which is white, and of others dark. 3. Cultivated, with very large leaves, not much cut, as the white Marseilles fig, and others with fruit of different colours. Those who are disposed to go farther may form three subvarieties under each of these heads, according as the fruit is blue or black, red or purple, or yellow, white, or green.

Garden Varieties. These are very numerous. In the *Nouveau Du Hamel*, a selection of 36 choice sorts is given, and several of them figured. In the Horticultural Society's *Fruit Catalogue* for 1831, 89 sorts are enumerated, independently of synonymes. In the *Encyc. of Gard.*, ed. 1835, a selection of 22 sorts is given for a large garden; and also selections for smaller gardens. For an arboretum in the climate of London, and to be treated as standards, we would recommend the wild fig (which has the leaves generally entire, and of which there is a standard tree in the Twickenham Botanic Garden), the white Marseilles, the Brunswick, and the small brown Ischia. The latter will, in very fine seasons, and in warm situations in the climate of London, ripen a few fruit on a standard in the open air.

Description, &c. The common fig is a low, deciduous tree, rarely exceeding 20 ft. in height as a standard, even in the south of Europe; with large deeply lobed leaves, rough on the upper surface, and pubescent beneath. The branches are clothed with short hairs, and the bark of the trunk is greenish. The fig is a native of the west of Asia and the shores of the Mediterranean, both in Europe and Africa. In no country is it found in elevated situations, or at a distance from the sea. Hence its abundance in the islands of the Archipelago, and on the shores of the adjoining continents. It has been cultivated from time immemorial; and, indeed, the fig was said to have been the first fruit eaten by man. In the *Bible*, we read frequently of the fig tree, both in the Old and New Testament. Among the Greeks, we find, by the laws of Lycurgus, that figs formed a part of the ordinary food of the Spartans. The Athenians were so choice of their figs, that they did not allow them to be exported; and the informers against those who broke this law, being called sukophantai, from two Greek words, signifying the discoverers of figs, gave rise to our modern word sycophant. The fig tree under which Romulus and Remus were suckled, and the basket of figs in which the asp was conveyed to Cleopatra, are examples familiar to every one of the frequency of the allusions to this tree in ancient history. At Rome, the fig was carried next to the vine in the processions of Bacchus, who was supposed to have derived his corpulency and vigour from this fruit, and not from the grape. Pliny, also, recommends figs as being nutritive and restorative; and it appears from him, and other ancient writers, that they were given to professed champions and wrestlers, to refresh and strengthen them. Pliny mentions six different kinds of fig, enumerating the peculiar qualities of each.

The first fig trees planted in England are said to have been brought from Italy in 1548, in the reign of Henry VIII., by Cardinal Pole, and placed by him against the walls of the archiepiscopal palace at Lambeth. In Miller's time, these two trees covered a surface of 50 ft. in height, and 40 ft. in breadth; and the diameter of the trunk of one tree was 9½ in., and of the other 7½ in. These trees were much injured by the severe winter of 1813-14; but the main stems being cut down, they recovered, so as in 1817 to be in tolerable

vigour, when Dr. Neill, and the other members of the deputation of the Caledonian Horticultural Society, inspected the archiepiscopal gardens. On our visiting the grounds, however, in September, 1836, we found that the trees had been destroyed some years before, when the palace was undergoing repair; and that the only traces left of them were some young plants raised from cuttings, which are now growing in the archbishop's kitchen-garden. At Mitcham, in the garden of the Manor House, formerly the private estate of Archbishop Cranmer, there was, in Miller's time, the remains of a white fig tree, confidently asserted to have been planted by Cranmer himself; but it was destroyed in 1790. Its stem, some years before, was 10 in. in diameter; but its branches were very low and weak. In the Dean's garden at Winchester, there existed, in 1757, a fig tree protected by a wooden frame, supposed to be of very great age. On the stone wall to which it was trained there were several inscriptions, one of which bore testimony that, in 1623, James I. "tasted of the fruit of this tree with great pleasure." Miller says that it was suffered to perish for want of necessary repairs to the framework. A fig tree brought from Aleppo by Dr. Pococke, and which was planted by him, in 1648, in the garden of the regius professor of Hebrew in Christ-Church, Oxford, seems to be the only ancient fig tree on record still existing in Britain. Some of the figs produced by this tree were exhibited at a meeting of the London Horticultural Society, in August, 1819; and others gained a prize, as the best white figs, at a meeting of the Oxford and Oxfordshire Horticultural Society, in August, 1833. An account of this tree, by Mr. Baxter, curator of the Oxford Botanic Garden, will be found in the London Horticultural Society's *Transactions*, vol. iii. p. 433.; from which it appears that, in 1806, Dr. White, then professor of Hebrew in Christ-Church, caused an engraving to be made of the tree. It was at that time 21 ft. high, and the trunk measured 3 ft. 6 in. in circumference at its upper part. The tree, when we saw it in 1833, contained but very slight remains of the old trunk; but it had thrown out a number of branches, perhaps at that time of 20 or 30 years' growth, and some of which were upwards of 25 ft. in length. (See *Gard. Mag.*, vol. x. p. 105.) The fig tree, though introduced so early, appears for a long time not to have been extensively cultivated in England. Professor Burnet thinks that this was owing to a popular prejudice, the fig having been once a common vehicle for poison: a singular contrast to the ideas expressed in the *Bible* respecting this fruit; the best blessing of heaven being typified by every man sitting under his own fig tree. In France, the culture of the fig tree was not carried to any degree of perfection till the time of Olivier De Serres; but it is now general throughout the whole country. In the south of France, figs are grown for drying as an article of commerce, but in the northern provinces they are only used for the table. In the East, as well as in Italy and Spain, figs form a principal article of sustenance for the population, and a considerable article of commerce. According to M'Culloch, the importation into Britain is about 20,000 cwt., notwithstanding that every cwt. pays a duty of 21*s.*, which exceeds 100 per cent upon the price of the figs in bond. If this duty were reduced, he says, to 8*s.* or 10*s.* the cwt., it may very fairly be concluded that the quantity imported would very soon be trebled, or more.

In Britain, the fig is in general cultivation in first-rate gardens; usually against walls; but in some parts of the southern counties, as along the coast of Sussex, and in Devonshire, &c., as standards. In Scotland, it is never seen as a standard; but it ripens its fruit against a south wall, without the aid of fire heat, in some parts of East Lothian, and in Wigtonshire; and against a flued wall, even in the neighbourhood of Glasgow. The largest fig tree against a wall which we have seen in England is at Farnham Castle, where, in 25 years, it has reached the height of 40 ft. against the walls of the castle. The largest standard fig trees that we have seen are at Arundel Castle, where they are upwards of 25 ft. high, with trunks 1 ft. in diameter. At Tarring, and at one or two other places near Brighton, fig trees are grown as standards,

and produce abundant crops; though the fruit is inferior in flavour to that ripened against walls, except in very fine seasons.

Properties and Uses. The fig is cultivated almost entirely for its fruit. Its wood, which is extremely light and tender, is used, in France, for making whetstones, from its facility in receiving and retaining the emery and the oil that are employed to sharpen smiths' tools. The soft wood is white, and the heart-wood yellow. It loses a great deal in weight by drying; but it acquires by that process so much strength and elasticity, that the screws of wine-presses are made of it. When used as fuel, it does not give a very intense heat; but its charcoal has the valuable property of consuming very slowly. The fruit is esteemed demulcent and laxative; and it has been long used in domestic medicine as a poultice. King Hezekiah's boil was cured by a lump or poultice of figs, applied according to the directions of Isaiah, and which, Professor Burnet observes, is the first poultice that we read of in history. In the Canaries, in Portugal, and in the Greek Archipelago, a kind of brandy is distilled from fermented figs. The leaves and bark of the fig tree abound in a milky acrid juice, which may be used as rennet, for raising blisters, and for destroying warts. This milky juice containing caoutchouc, Indian rubber might consequently be made from the common fig tree in England, if it were thought desirable; and, on account of the same property, the very tenderest of the young leaves might be given to the larva of the silkmoth. All the species of the genus *Ficus*, and also of the allied genus *Cárica*, are said to have the singular property of rendering raw meat tender when hung beneath their shade. On what chemical principle this is to be accounted for, we are ignorant, but the fact seems undoubted. As a fruit tree, the fig is valuable for thriving and ripening fruit in situations not favourable in regard to light, air, or soil; such as against walls in court-yards, against the walls of houses in crowded cities, on the back-walls of green-houses and forcing-houses, comparatively in the shade, &c. It also bears better than any other fruit tree whatever, in pots; and, with abundance of liquid manure and heat, will produce, in a stove, three, and sometimes even four, crops in the course of a year.

Culture and Management of the Fig in Countries where it is grown as an Article of Commerce. In France, more particularly about Marseilles, when a fig plantation is to be formed, an open situation is made choice of near the sea, and exposed to the south and the east. The ground is trenched 2 ft. or 3 ft. deep, and richly manured; and the trees are planted in squares, or in quincunx, at from 12 ft. to 15 ft. distance from each other. The plants are watered frequently during the first summer, and left without any pruning whatever; but in the winter of the second year they are cut down to the ground. The third year, they throw up vigorous shoots, five or six of which are retained to form a bush; and in the following, or fourth, year the tree is suffered to ripen fruit. In some cases, the trees are trained to single stems; and this is generally the case in Italy and Greece, where the climate is milder, and the tree attains a larger size than in France. In the future management of the trees, they require very little pruning, except when they get too much crowded with branches. They seldom suffer from insects; but always more or less, during very hot summers, from the want of water, which they require in abundance, on account of the excessive transpiration which takes place from their large leaves and very porous bark, which has but a very slight epidermis. Hence, in seasons of very great drought, the branches are sometimes completely burnt up. Severe frost has the same effect on the branches in winter, even at Marseilles, as extreme drought has in summer. In the south of France, and in all countries which may properly be called fig climates, two crops are produced in a year: the first is from the old wood, and corresponds with our crops in England; and the second from the wood of the current year, the figs produced by which, in this country, are never ripened except in hot-houses. In Greece and Egypt a third crop is sometimes produced. The first crop is ripened, in the south of France and in Italy, in May; and the second crop in September. Those which are to be dried are left on the tree till they are

dead ripe, which is known by a drop of sweet liquid which appears hanging from the eye. The figs, being gathered, are placed on wicker hurdles, in a dry airy shed; and, when the dew is off, every morning they are exposed to the sun during the hottest part of the day. To facilitate the progress of drying, the figs are occasionally flattened with the hand; and, in moist dull weather, they are placed in rooms warmed by stoves. When thoroughly dried, they are packed in rush baskets, or in boxes, in layers, alternately with long straw and laurel leaves, and in this state they are sold to the merchants. In some parts of the south of France, figs are prepared by dipping them in hot lye made from the ashes of the fig tree, and then dried; the use of lye being to harden their skins. The white figs are preferred for the market, the violet kind being retained in the country for the use of the inhabitants; and forming in Greece, with barley bread, their principal food for a great part of the year. Fowls are remarkably fond of figs; and, where they are abundant, as in the department of the Var in France, and in the islands of the Archipelago, they are given to horses, mules, and oxen, with a view to strengthen and bring them into good condition, or to fatten them.

Culture and Management of the Fig in the North of France. Except in the gardens of private persons, where the fig is generally trained against walls, as in England, there are only two or three places where it is grown for its fruit as a standard; and the principal of these is at Argenteuil, in the neighbourhood of Paris. We visited the fig gardens there in 1828; and an account of them, at length, will be found in the *Gardener's Magazine*, vol. vii. p. 262. The fig trees are kept as low bushes, and the shoots are never allowed to attain more than three or four years' growth; because it is necessary to bend them down to the ground, and retain them there, by means of stakes, or stones, or a mass of soil, to protect them from the drying effects of the frost. It is observed in the *Nouveau Cours d'Agriculture*, that the figs at Argenteuil are never brought to such a degree of perfection as to please the palates of those who have been accustomed to the figs of Marseilles. They are, says the writer, always either insipid or half rotten; and, even to bring them to this state, it is necessary to pinch off the points of the shoots, in the same way as is done with the vine when early grapes are wanted; or with the pea, to accelerate the maturity of the pods. An additional process is requisite in cold seasons, and at the latter end of every season; and that is, the inserting of a small drop of oil, by means of a straw, into the eye of the fruit; which has the effect of destroying the vital principle, and causing the fig to part readily from the shoot, like ripe fruit; after which it soon begins to decay.

Caprification. This process, which we shall hereafter describe, and which has been in use for an unknown length of time in the Levant, was first mentioned by Tournefort; and, though it is laughed at by many of the French physiologists of the present day, we cannot help thinking that it must be of some important use. It is alleged by Bosc that it has no other object than that of hastening the maturity of the crop; but others are of opinion that, by insuring the fecundation of the stigma, it tends to increase the size of the fruit, and, by filling it with mature seeds, to render it more nourishing. Olivier, the botanical traveller, asserts that, after a long residence in the islands of the Archipelago, he is convinced of the inutility of the practice; and Bosc, though he allows that it may hasten the maturity of the figs, as the larva of the pyrale pommonelle hastens the maturity of the apple in France, yet believes that it has no effect in improving either the size or the flavour of the fruit. M. Bernard, the author of a *Mémoire sur le Figuier*, and of the article on that tree in the *Nouveau Du Hamel*, goes farther, and asserts that the figs which have undergone the process of caprification are inferior to others in size, flavour, and the property of keeping. In Egypt, where the sycamore fig is the prevailing species, an operation is performed on the fruit, which is said to answer the purpose of caprification, as far as respects early ripening. When the fruit is a third part of its size, a slice is cut off the end of it, of a sufficient depth to remove all the stamens, which have not by this time matured their fertilising dust. The wound is

immediately covered with sap, which thickens, and forms a mass that excludes the air from the interior of the fruit; and the consequence is, that it ripens, or becomes ready to drop off, in half the time usually taken by nature, without losing any of its size or of its flavour. This process, Bosc observes, deserves a trial in France.

The Process of Caprification is described by Tournefort; and his description differs very little from that given by Pliny. It consists in inducing a certain species of insect of the gnat kind, which abounds on the wild fig, to enter the fruit of the cultivated fig, for the purpose of fecundating the fertile flowers in the interior of the fruit by the farina of the barren ones near its orifice. The details will be found given at length in Rees's *Cyclopædia*; under the word Caprification in Martyn's *Miller*; and in the *Encyclopædia of Geography*.

Propagation and Culture. The fig is easily propagated by cuttings of the shoots or roots, not one of which will fail; and also by suckers, layers, and seeds. In British nurseries, it is generally propagated by layers; though these do not ripen their wood, the first season, so well as cuttings. When the fig is to be planted as a standard tree, constant attention must be paid to remove all suckers from its collar, and all side shoots from its stem. When trained against a wall in a cold climate, the branches should proceed from a single stem, and not from the collar, as is generally the case; because the plant, when so treated, produces shoots which are less vigorous, and, consequently, more likely to ripen their wood.

Insects, Accidents, and Diseases. The fig, in hot countries, and in dry seasons, especially when at a distance from the sea, is apt to have its leaves and fruit scorched and shriveled up by the sun. It is scarcely subject to any diseases; but it is liable to the attacks of the cochineal, the kermes, and psylla. In British gardens, it is very seldom injured by insects in the open air; but it is very liable to the attacks of the red spider, the coccus, and the honey-dew, under glass. Abundance of water, and a moist atmosphere, like that of its indigenous habitat, the sea shore, are perhaps the best preventives.

Statistics. The largest standard fig trees that we know of in the neighbourhood of London are at Syon, Chiswick, and in the Mile End Nursery, where they are about 15 ft. high. In Sussex, at Arundel Castle, there are several standard trees in the old garden, 25 ft. high; at Tarring, near Worthing, in the largest fig garden, there are 70 standard trees, from 12 ft. to 15 ft. high. At Blackdown House, near Haslemere, there are some fine old standard fig trees, which ripen fruit every year. In France, in the neighbourhood of Nantes, the tree, as a standard, seldom exceeds 18 ft. in height: at Avignon it attains the height of 20 ft. or 25 ft.; and, in 1819, we observed some very fine specimens in the garden of the Military Hospital there. In Italy, at Monza, a tree, 60 years old, is 30 ft. high; the diameter of the trunk 1½ ft., and of the head 60 ft. Plants, in the London nurseries, are from 1*s.* 6*d.* to 5*s.* each, according to the variety; at Bollwyller, 2 francs each; and at New York, from 50 cents to 1 dollar.

Genus V.



BO'RYA W. The Borya. *Lin. Syst.* Diœ'cia Di-Triándria.

Identification. Willd. Sp. Pl., 4. p. 711.; Ait. Hort. Kew., ed. 2, vol. 5.; Lindl. Nat. Syst. of Bot., p. 178.
Synonymes. Adèlia *Michx. Fl. Bor. Amer.*, 2. p. 223.; Bigelòvia Smith in Rees's Cyclop., Addenda.
Derivation. Named in honour of *Bory de St. Vincent* who visited the Mauritius and the Isle of Bourbon, to examine their botany. Smith, in Rees's *Cyclopædia*, objects to the name of Bòrya being applied to this genus, because La Billardière had previously given the same name to another genus; and he suggests the substitution of the name of Bigelòvia, in commemoration of Dr. Bigelow of Boston, author of the *Florula Bostoniensis*, and of the *American Medical Botany*. The genus Bòrya Lab., and the genus Bòrya Willd., are both cited in Lindl. *Natural System of Botany*, and it is most probable that another name will be instituted for one of them.

Description, &c. Deciduous shrubs, growing to the height of from 6 ft. to 12 ft. in common garden soil, with a dark brown or purple bark, and small, deep green, opposite leaves. Propagated by cuttings, and quite hardy.

♀ 1. B. LIGU'STRINA *Willd.* The Privet-like Borya.

Identification. Willd. Sp. Pl., 4. p. 711.; Ait. Hort. Kew., ed. 2., vol. 5.
Synonymes. Adèlia ligústrina *Michx. Fl. Bor. Amer.*, 2. p. 224.; Bigelòvia ligústrina *Smith* in *Rees's Cyclop. Addenda, Lodd. Cat.*, ed. 1836.
The Sexes. The plants bearing this name in Loddiges's arboretum have not yet flowered.

Spec. Char., &c. In habit and leaves, somewhat resembling the common privet (*Ligústrum vulgàre L.*). Leaves with very short petioles, and disks that are lanceolate-oblong, entire, somewhat membranous. Fruit rather shortly ovate. (*Michx. Fl. Bor. Amer.*) A native of North America, in thickets about rivers, in the countries of the Illinois, Tennessee, &c.; flowering in July and August. (*Smith.*) Introduced into England in 1812, by Lyon; and there are plants in the arboretum of Messrs. Loddiges, where it grows freely in common garden soil, forming a shrub, apparently a fit associate for *Ligústrum*, Fontanèsia, and *Prìnos*.

■ 2. B. (? *L.*) ACUMINA'TA *Willd.* The acuminate-*leaved* Borya.

Identification. Willd. Sp. Pl., 4. p. 711.; Ait. Hort. Kew., ed. 2., vol. 5.
Synonymes. Adèlia acuminàta *Michx. Fl. Bor. Amer.*, 2. p. 225. t. 48.; Bigelòvia acuminàta *Smith* in *Rees's Cyclop. Addenda*, *Lodd. Cat.*, ed. 1836.
The Sexes. Uncertain which is in England.
Engravings. Michx. Fl. Bor. Amer., 2. t. 28.; and our *fig.* 1229.


1229

Spec. Char., &c. Leaves membranous, lanceolate in almost a rhombic manner; but most tapered to the outward end; $1\frac{1}{2}$ in. long, serrulate.—Male flowers several together in small sessile tufts, encompassed with several ovate bracteas. — Female flowers stalked, very small. Fruit pendulous, elliptic-oblong, nearly 1 in. long before it is ripe, tapered to the tip in a beak-like manner. — It appears that the taper lateral branches form something like thorns. (*Michx.* and *Smith.*) Indigenous to the banks of rivers in Carolina and Georgia. Introduced into England in 1812; but the plants in the arboretum of Messrs. Loddiges have not yet flowered. The only difference which we can observe between B. acuminàta and B. *ligústrina* is, that the former has the leaves of a paler green.

■ 3. B. (*L.*) PORULO'SA *Willd.* The pore-*like-dotted-leaved* Borya.

Identification. Willd. Sp. Pl., 4. p. 711.; Ait. Hort. Kew., ed. 2., vol. 5.
Synonymes. Adèlia porulòsa *Michx. Fl. Bor. Amer.*, 2. p. 224.; Bigelòvia porulòsa *Smith* in *Rees's Cyclop., Addenda*; ? B. ovàta *Lodd. Cat.*, ed. 1836.
The Sexes. Uncertain which is in England.

pec Char , &c Leaves coriaceous, sessile, lanceolately ovate, but with a blunt point, entire; the lateral edges revolute; under surface rather rusty, and punctured with little holes. (*Michx. Fl. Bor. Amer.*) It is indigenous to the coasts of Georgia and Florida. Introduced into England in 1806. The plants in the collection of Messrs. Loddiges differ from B. *ligústrina*, chiefly in the leaves being shorter.

■ 4. B. DISTICHOPHY'LLA *Nutt.* The two-rowed-leaved Borya.

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 232.

Spec. Char., &c. A shrub, 12 ft. to 16 ft. high. Leaves in two rows, subsessile, lanceolate, acute, entire rough at the edge, membranous. Branchlets very slender. Scales of the bud pungently acute, [?] "confluent in the leaves." Indigenous to the banks of French Broad River, East Tennessee. (*Nuttall*, who had seen it alive.) Mr. George Don thinks that this plant has been introduced; but we have never seen it.

CHAP. CI.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER *ULMA'CEÆ.*

THEY are included in three genera, which have the following names and characters: —

U'LMUS L. Flowers, in most species, protruded earlier than the shoots and leaves of the year; disposed in groups, each group lateral, and proceeding

from a bud peculiar to it; the flowers of the group situated each upon a peduncle, or each upon a pedicel, and disposed a few together upon short peduncles, or situated in both modes. Flowers bisexual, or a few of them male: both kinds upon one plant. Calyx reddish, distinct from the ovary, top-shaped, or bell-shaped, of one piece, but having 5 or 4—8 segments, which are imbricate in æstivation; remaining until the fruit falls. Stamens as many as the segments; inserted into the lower part of the calyx, oppositely to the segments, and prominent beyond them: anthers opening lengthwise, outwardly (*Smith*), inwardly (*T. Nees ab Esenbeck*). Ovary elliptic-oblong, compressed, cloven at the summit, having two cells and a pendulous ovule in each. Style very short, or there is not one. Stigmas 2, acuminate, villous on the inner face. — Fruit a samara, and this compressed, more or less round or oval, and having the wing-like part membranous, broad, and present all round, except in a notch, whose base is the place of the attachment of the stigmas. Seed: 1 in a samara, pendulous: in many instances, it is not perfected. Embryo not attended by albumen, straight, its radicle uppermost.—Species several: wild in Europe, North America, and India; one or more in Asia, one in China. Trees: some of the species attaining great size and age. Bark rugged. Wood hard. Branches twiggy. Flowers small. Leaves alternate, in 2 ranks, feather-veined; in most, unequal at the base, annual, serrate, and harsh to the touch. Stipules oblong, deciduous. Leaves within the bud folded lengthwise, in 2 portions, upright, with scales between leaf and leaf. (*T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.; Smith, Engl. Flor.; Duby et Decand. Bot. Gallic.;* and observations.)

PLA'NERA Gmelin. Sexes polygamous, or each in a distinct flower; in each case, upon the same plant.—Female and bisexual flowers. Calyx bell-shaped, distinct from the ovary, membranous, green, of one piece, but having 5 ciliate lobes. Stamens, in the bisexual flower, 4—5 less developed than those in the male flower. Ovary top-shaped, villous. Stigmas 2, sessile, diverging, white, pimpled. Fruit roundish, gibbous, pointed, dry, 2-celled, each cell containing 1 seed.— Male flower. Calyx as in the female and bisexual flowers. Stamens 4—5, inserted near the centre of the bottom of the calyx, and oppositely to its lobes. Anthers reaching a little beyond the lobes of the calyx, borne outwardly to the filament, of 2 lobes that seem as 4, and 2 cells that open sidewise and lengthwise.—In P. Gmèlin*i* the fruits are in heads; and in P. Richárd*i* nearly solitary.—Species 2—? 3. Trees: natives of Asia and North America. Leaves alternate and more or less ovate and toothed; feather-veined and annual; and the flowers small, and not showy. P. Richárd*i* has stipules: which are straight, pointed, villous, and soon fall off. This species has united by ingrafting with the elm. (*Turpin* and *Michaux*.)

CE'LTIS Tourn. Flowers borne upon the shoots of the year, axillary; either solitary, or 2—3 together, each, in any case, upon a peduncle; or from 2 to many, in a raceme or panicle: in the kinds hardy in Britain, the flowers are protruded just previously to the leaves to which they, or the fruits, are afterwards axillary: bisexual, or, less commonly, by the imperfection of the pistil, only male in effect; both kinds upon one plant, and when they occur in the same raceme, the latter are the lower. Calyx bell-shaped, distinct from the ovary, 5—6-parted, the segments imbricate in æstivation. Stamens 5—6, inserted into the base of the calyx, oppositely to its lobes, and they are shorter than the lobes. Filaments at first incurved. Anthers cordate-acuminate; the cells 2, opening at the sides. Ovary ovate, 1-celled. Stigmas 2, sessile, acuminate, long, spreading or recurved, downy or glanded, simple or 2-parted. Fruit a drupe, subglobose. Ovule and seed, each 1, and pendulous. Embryo sickle-shaped, its radicle uppermost: traces of subgelatinous albumen are between the cotyledons.—Species 19 or more; 1 wild in Europe, the north of Africa, and Iberia; in the Levant; and 2 in China; 4 in North America; some in the West Indies and South America;

several in India. Some of them grow in moist soil. Most of them are trees with spreading heads and slender branchlets. In some, the bark of the branchlets and branches has white oblong spots scattered here and there. Leaves alternate, in 2 ranks, ovate and pointed, unequal at the base, serrate; rough on the upper surface, apparently from the callous bases and remains of bristles; annual in the kinds hardy in Britain, and these have the primary veins forming but a small angle with the midrib, and extending through a considerable portion of the length of the disk of the leaf. Stipules lanceolate, soon falling off. Leaves in the bud not folded, but plaited, with scales present between leaf and leaf. Fleshy part of the fruit eatable, but small in quantity. (*T. Nees ab Esenbeck, Gen. Pl. Fl. Germ.; Spreng. Syst.; Wats. Dend. Brit.; Smith* in *Rees's Cycl.; Duby et Dec. Bot. Gallic.;* and observations.)

GENUS I.



U'LMUS *L.* THE ELM. *Lin. Syst.* Pentándria Digýnia.

Identification. Lin. Gen., 123.; Lam. Ill., t. 185.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3 t. 3.; Sm. Engl. Fl., 2. p. 1, 2. and 19.; Lindl. Nat. Syst. of Bot., p. 179.

Synonymes. Orme, *Fr.*; Ulm, or Rüster, *Ger.*; Olmo, *Ital.*

Derivation. U'lmus is supposed to be derived from the Saxon word *elm*, or *ulm*; a name which is applied, with very slight alterations, to this tree, in all the dialects of the Celtic tongue. Ulm is still one of the German names for the elm; and the city of Ulm is said to derive its name from the great number of elm trees that are growing near it. There are above forty places in England, mentioned in the *Doomsday-Book*, which take their names from that of the elm; such as Barn Elms, Nine Elms, &c.

Description, &c. The elms are long-lived trees, with hard wood; rugged, and sometimes corky, bark; and zigzag, somewhat slender, branches. The leaves are alternate, stalked, deciduous, in general serrated and harsh; unequal at the base, and bearing tufts of hairs at the axils of the primary veins. The flowers are earlier than the leaves, tufted, copious, and dark red; the capsules are pale, chaffy, and light, serving as a wing to the seed, which is often imperfect. (See *Smith's Engl. Flora*, ii. p. 19.) The roots of young plants, in some of the species, are of leathery toughness, very strong, of considerable length and suppleness. The commoner, and perhaps all, the kinds increase rapidly in the number and the size of their roots and branches. *U.* campéstris emits suckers from the older roots, which are extended under the surface of the soil; but this is not the case with *U.* montàna. All have strong upright-growing trunks; but these vary, in the several kinds, in their diameters and length. The disposition of the branches relatively to the trunk, and to the head which they constitute, also varies exceedingly; and considerable difference of character prevails in the spray. For example, the tufted twigs of *U.* campéstris bear very little resemblance to the prominent wand-like shoots which stand out thinly over the surface of the heads of young trees of *U.* montàna, and all its varieties, or allied species; though in old trees the branches spread horizontally, and become drooping at their extremities. The tufted shoots of *U.* campéstris assume occasionally the character of knots of entangled cord; and those tufts are called witch knots in some places. The character of the foliage is nearly the same in all the kinds of elm. That of *U.* campéstris is very striking, from the smallness of the leaves, their number, the depth of their green, and their somewhat rounded figure: they remain on, also, till very late in the year. In *U.* montàna, *U.* m. glàbra, *U.* americàna, and in some other kinds, the leaves are large, long, and sometimes pointed, with the marginal teeth more obvious, though, perhaps, only from the size of the disk; their green is lighter; and, in general, they fall off much earlier, than those of *U.* campéstris. The different kinds vary, also, considerably in their time of leafing. The leaves of all the sorts have the base unequal, the margins doubly dentated, and are feather-nerved. The flowers are always protruded before the leaves, and are disposed in small groups,

which give a knotted character to the leafless branches, before they are fully developed; but which afterwards, from their colour, and their being supported on peduncles, look like little tufts of red fringe. The seeds of the elm, also, differ in the different kinds. "The inner bark of the elm is slightly bitter and astringent; but it does not appear to possess any important quality. The substance which exudes spontaneously from it is called ulmine." (*Lindley's Nat. Syst. of Bot.*, p. 179.) Small bladders which possess considerable vulnerary properties are found on the leaves of elms, particularly in warm countries. The elm is a native of Europe and North America, and part of Asia and Africa, extending as far south as the coast of Barbary, and as far north as Russia. The elm has been a well known tree since the time of the Romans; and, of all the European trees, it is that which is the most generally cultivated, and most commonly applied to agricultural purposes. The reasons for this preference, no doubt, are, that its culture is extremely easy; its growth rapid; and that it will thrive in almost any soil or situation. It may also be transplanted, with comparative safety, at almost any age; and the timber will remain uninjured for a greater length of time than any other, when exposed to moisture. To counterbalance these advantages, the timber is very apt to shrink and warp, unless it be constantly moist, or the wood be kept for several years, after it is cut, before it is used. The tree, while in a living state, is also very often attacked by insects; and the timber is liable to become worm-eaten. Trees grown on a dry soil, and singly, make the best timber; but they are neither so large nor so long-lived as those grown in a moister soil, which form what is called in France *le bois gras*. Notwithstanding this, the elm will not thrive in very moist soil, as it is by no means an aquatic tree, like the alder. The wood of elms that have been frequently pruned becomes knotted; and this wood, when polished, is very ornamental. To obtain it, the trees in France are sometimes kept lopped, and headed down every three or four years. The variety called the twisted elm (orme tortillard) is also much esteemed for its wood; as are the monstrosities, or knobs, found occasionally on all the species of elm; and which, when cut into thin slices, and polished, are kept by cabinet-makers for the purpose of veneering.

The elm is remarkable for the aptitude of the different species to vary from seed; so much so that it is extremely difficult to say in this genus which are species and which are varieties; or even to what species the varieties belong. To us it appears, that there are only two sorts which are truly distinct; viz. *U.* campéstris and *U.* montàna. *U.* americàna, we are assured by Mr. Masters of Canterbury, who has paid great attention to the genus, and raised many sorts, both from American and European seeds, is identical, or apparently so, with what is called the Huntingdon elm; a variety raised at Huntingdon, between 80 and 90 years ago, from seeds gathered from trees in that neighbourhood. *U.* glàbra and *U.* màjor seem intermediate between *U.* campéstris and *U.* montàna. *U.* effùsa appears very distinct; but is probably only a variety of *U.* campéstris. Of all the numerous varieties which may be procured in British nurseries, the best kinds for cultivation for their timber appear to be, the Huntingdon elm (*U.* m. glàbra vegèta), and the wych elm (*U.* montàna); and for ornament, the weeping elm (*U.* montàna péndula), the subevergreen elm (*U.* campéstris vìrens), and the twiggy elm (*U.* campéstris viminàlis). The sucker-bearing elms are chiefly the varieties of *U.* campéstris, and these seldom produce seeds; but *U.* montàna, and *U.* m. glàbra, and their varieties, which never throw up suckers, produce seeds in the greatest abundance every year. *U.* campéstris does indeed produce seeds occasionally, though rarely, in England; and the *U.* c. viminàlis is a British seedling. In France, *U.* campéstris ripens seeds much more freely, and these have given rise to many varieties.

♀ 1. *U.* CAMPE'STRIS *L.* The *English*, field, *or common small-leaved*, Elm.

Identification. Lin. Sp. Pl., 327.; Willd. Sp. Pl., p. 1324.; Host Fl. Austr., 1. p. 330.; Sm. Engl. Fl., 2. p. 20.; Lindl. Synops., p. 226.; Hook. Br. Fl., ed. 2., p. 141.; Mackay Fl. Hibernica, pt. 1. p. 240.

Synonymes. U'lmus Atinia *Pliny Nat. Hist.*, lib. 16. cap. 17., and lib. 17. cap. 11., *Cam. Epit.*, 70., *U.*, No. 1586. 3, *Hall. Hist.*, 2. 269. ; *U.* minor, folio angusto scabro, *Ger. Emac.*, 1480. f., *Raii Syn.*, 469.

Engravings. Engl. Bot., t. 1886. ; N. Du Ham., 2. t. 42. ; Dod. Pempt., 837. f. ; Ger. Emac., 1480. ; Hayne, t. 27. ; Michx. North Amer. Sylva, iii. t. 129. f. 1. ; and the plates in our last Volume.

Spec. Char., &c. Leaves doubly serrated, rough. Flowers nearly sessile, 4-cleft. Samara oblong, deeply cloven, glabrous. (*Smith Eng. Flora.*) A tree from 60 ft. to 80 ft. in height; flowering in March and April, and ripening its seeds in May.

Varieties. These are very numerous, both in Britain and on the Continent; and most of them have been selected by nurserymen from their seed-beds. Any one, Baudrillart remarks, who has ever observed a bed of seedling elms, must have noticed that some have large leaves, and some small ones; some are early, and some late; some have smooth bark, and some rough bark; and some soft leaves, and others very rough ones. Some varieties are higher than others; the branches take now a vertical, and again a horizontal, direction. In short, while botanists describe, and cultivators sow, they will find that nature sports with their labours, and seems to delight in setting at fault alike the science of the one, and the hopes of the other. This is always the case with plants that have been long submitted to the cultivation of man. The cares that are bestowed upon them, the different situations in which they are placed, and the different kinds of treatment which they receive, appear to change their native habits. (See *Dict. des Eaux et Forêts*, ii. p. 460.) The quantity of the timber of the several varieties differs as much as the size of the leaves and the habit of growth. In some varieties, such as *U.* c. viminàlis, it is of no value, from the slenderness of the trunk; in others, the tree is subject to decay at the joints of the branches, the bark to split into long thin strips, and the interior of the trunk to rot. The most valuable varieties for cultivation as timber trees are, *U.* c. strícta, *U.* c. acutifòlia, *U.* c. álba, and *U.* c. latifòlia. We shall first give the names of the principal varieties of the common English elm which are to be found in British nurseries; and, next, the names of those which are said to be cultivated in France. We might have doubled the number of these varieties; and we should have felt justified in including among them *U.* suberòsa, and perhaps some other kinds which we have treated as species; for there is, in truth, no certainty as to what are species and what varieties in elms.

A. *Timber Trees.*

‡ U. *c.* 1 *vulgàris*, *U.* campéstris *Hort. Dur.*—Very twiggy; pale smooth bark; of irregular growth in some plants, with almost horizontal branches, where no others are near to force the shoots upwards. In some soils, it is very subject to decay at the joints. The bark is leaden-coloured while young, splitting into long thin strips with age. A bad variety to cultivate for timber.

‡ U. *c.* 2 *latifòlia* Hort. has broader leaves than the species, and expands them very early in spring. There is a tree of this variety in the London Horticultural Society's Garden, which, in 1824, after being 10 years planted, was 17 ft. high.

‡ U. *c.* 3 *álba* Masters.— Of upright growth. The old bark cracks in irregular long pieces, and becomes very pale with age. Shoots with the bark tinged with red, and the footstalks of the leaves quite red. Leaves shining, and doubly and deeply serrated, bearing a very near resemblance to those of *U.* effùsa. A valuable timber tree.

‡ U. *c.* 4 *acutifòlia* Masters. — Growth, during its early stages, very like the last, but stronger. The leaves, in old specimens, more tapering, and the branches more pendulous. The young leaves do not justify its name. Bark like the last. This appears very common in some parts of Essex, Suffolk, and Norfolk. Also a good timber tree.

‡ U. *c.* 5 *strícta* Hort. Dur. Red English Elm. — One of the most valuable timber trees of the small-leaved kinds. Growth very rigid.

The timber is excellent; and the tree forms poles of equal diameter throughout. There are fine specimens of this tree in Minster, Thanet, and at Ickham, near Canterbury. In Mr. May's park, at Herne, where there are several kinds of elms, all of which thrive remarkably well, one recently cut down showed this day (Nov. 14. 1836) indications of upwards of 100 years' growth. A portion of the trunk girts 15 ft. for 16 ft. in length. The remaining part of the tree has been appropriated. There is a tree in the Horticultural Society's Garden, marked *U.* c. rùbra, which, judging from the specimens sent to us by Mr. Masters, appears to be identical with this variety. It is a splendid tree, and, in 1834, had attained the height of 32 ft., with a trunk 7 in. in diameter, after being 10 years planted.

♣ U *c.* 6 *virens* Hort. Dur., or Kidbrook Elm, is almost evergreen in a mild winter; and, as such, is the most ornamental tree of the genus. It must not, however, be depended upon as a timber tree, because, in some autumns, the frost kills the shoots. The bark is red, and the tree of spreading habit. This, like the last-mentioned kind, grows well upon chalk. Notwithstanding its name of Kidbrook elm, a place in Sussex, it is a Cornish variety. There is a fine tree in the Horticultural Society's Garden, named there *U.* montàna nodòsa, which fully answers to the above description of Mr. Masters.

♣ U. *c.* 7 *cornubiénsis* Hort.; *U.* strícta *Lindl. Synop.*, p. 227., *Lodd. Cat.*, ed. 1836; *the Cornish Elm*; is an upright-branched tree, with small, strongly veined, coriaceous leaves. "Branches bright brown, smooth, rigid, erect, and very compact." (*Lindl.*) This variety, in the climate of London, is a week or fortnight later in coming into leaf than the common elm. It attains a very great height, and has a somewhat narrower head than the species. There are very large specimens of it at Bagshot Park, 70 years planted, which are 70 ft. high; the diameter of the trunk 3 ft., and of the head 40 ft. In Worcestershire, at Croome, the tree, 50 years planted, is 70 ft. high; the diameter of the trunk 2 ft., and of the head 15 ft. There are young trees in the Horticultural Society's Garden, one of which, in 1834, after being 10 years planted, was 15 ft. high; and several at Messrs. Loddiges's. Dr. Lindley mentions a subvariety of this sort, with much smaller leaves; which he has named *U.* s. 2 parvifòlia, and which is the *U.* s. 2 microphýlla of *Lodd. Cat.*, 1836. There are two other subvarieties mentioned in *Lodd. Cat.*, under the names of *U.* s. áspera, and *U.* s. críspa.

♣ U. *c.* 8 *sarniénsis*; *U.* sarniénsis *Lodd. Cat.*, 1836; *the Jersey Elm*; is a free-growing variety, differing very little from the species. There are trees of this kind 20 ft. high in the Horticultural Society's Garden.

♣ U. *c.* 9 *tortuòsa*; *U.* tortuòsa *Lodd. Cat.*, 1836; ? Orme tortillard, *Fr.* *The twisted Elm.* — For an account of the uses of this tree, see the list of French varieties, p. 1379. There is a plant in the London Horticultural Society's Garden, 6 ft. high.

B. *Ornamental, or curious, Trees.*

♣ *U. c.* 10 *fòliis variegàtis* Lodd. Cat., ed. 1836. — This variety, which may be called the silver-leaved elm, has the leaves striped with white, and, in spring, is very ornamental.

♣ U. *c.* 11 *betulæfòlia*, *U.* betulæfòlia *Lodd. Cat.*, ed. 1836, has leaves somewhat resembling those of the common birch.

♣ U. *c.* 12 *viminàlis*; *U.* viminàlis *Lodd. Cat.*, ed. 1836; and the plate in our last Volume; has small leaves, and numerous slender twig-like branches. It is a very distinct and elegant variety; and easily recognised, either in summer or winter. In some stages of its foliage, this sort is frequently mistaken for a variety of birch. It is quite useless for timber, but makes an ornamental tree, with a character of its

own. It was raised in 1817, by Mr. Masters. The stems are erect; and it does not appear likely to exceed 30 ft. in height. It produces an abundance of twigs, and these are in great part pendulous, whence its name. There is a fine tree of this variety in the Horticultural Society's Garden, which, in 1834, when we had a drawing taken of it, was 30 ft. high.

♆ U. *c.* 13 *parvifòlia*; *U.* parvifòlia *Jac. Pl. Rar. Hort. Schœnbr.*, iii. p. 261. t. 262., *Poir. Encycl. Suppl.*, iv. p. 189., *Rœm. et Schult. Syst. Veg.*, vi. p. 302., *Willd. Enum. Hort. Berol.*, i. p. 295., *Willd. Baumz.*, i. p. 521.; *U.* microphýlla *Pers.*; *U.* pùmila var. β (transbaïcalénsis) *Pall. Ross.*, i. p. 76. t. 48.; *U.* pùmila *Willd. Sp. Pl.*, i. p. 1326., *Ait. Hort. Kew.*, *Gmel. Sib.*, iii. p. 105. No. 82., *Poiret Encyc. Méth.*, iv. p. 612. *Rœm. et Schult. Syst. Veg.*, vi. p. 202.; *U.* p. fòliis párvis, &c., *Pluk Alm.*, p. 293.; *U.* hùmilis *Enum. Stirp. Ruth.*, p. 180. No. 260.; and our *fig.* 1230. — A tree, according to Pallas, who mentions several varieties of it, very common in all the woods of the south of Russia, and varying in height from that of a middle-sized tree to that of a diminutive shrub, according to the soil and climate in which it grows. It is very plentiful about Caucasus; through Siberia, it gradually becomes more scarce; but it occurs again about the Lake Baikal, where the inhabitants use the leaves as a substitute for tea. It has been treated by most botanists as a species; but it is not nearly so distinct from *U.* campéstris as *U.* c. viminàlis, which we know to have been raised, by Mr. Masters, from seeds of the common English elm. The wood of this variety, according to Pallas, when it assumes a tree-like form, is very hard and tough; and it is veined with transverse lines. The root is also beautifully variegated, and used by the turner and cabinet-maker. One of the subvarieties mentioned by Pallas has the bark somewhat fungous or corky; another has the branches slender, wand-like, and of a whitish grey. In mountain rocks, the branches are short and thick; but, in sandy soils, the trees are small, and the shoots slender.



1230

♆ U. *c.* 14 *planifòlia*, *U.* planifòlia *Hort.*, and the plate of this tree in our last Volume, is a handsome small tree, closely resembling the preceding variety.

♆ U. *c.* 15 *chinénsis*; *U.* chinénsis *Pers.*, i. p. 291. No. 9., *Rœm. et Schult. Syst. Veg.*, vi. p. 303.; Thé de l'Abbé Gallois, Orme nain, *Fr.*; and our *fig.* 1231.; is a low bush, introduced from China, but when is uncertain. Notwithstanding the circumstance of its being kept in green-houses in some cases, and retaining its leaves there through the winter, we cannot consider it as anything else than a variety of *U.* campéstris. We are confirmed in this opinion by Mr. Main, who brought home some plants of this sort from China, and found them stand the rigour of our winters in the garden of his friend, the Rev. Mr. Norris of Grove Street, Hackney. (See *Gard. Mag.*, vol. ii. p. 139.) We believe it to be the same sort which is sometimes imported from China, in the form of a miniature old tree, planted in a China vase. While retained in these vases, and sparingly supplied with nourishment, it maintains its stunted figure; but, planted out in the free soil, in a fàvourable situation, in a year or two

1231



it will make shoots 5 ft. or 6 ft. long, as may be seen in the garden of the London Horticultural Society. The manner in which the Chinese procure these miniature trees is, by ringing the extremities of the branches of old trees, and then applying a ball of loam, kept moist by water and moss, till roots are thrown out from the callosity formed at the ring; when the small branch is cut off, and planted in a porcelain pot, either, says Mr. Main, "round, or, most commonly, an elongated square, 12 in. or 14 in. long, 8 in. wide, and about 5 in. in depth. Along with the tree they place pieces of stone, to represent rocks, among which moss and lichens are introduced. The tree, thus planted, is not allowed to rise higher than about 1 ft. or 15 in.; no greater supply of water is given than is just sufficient to keep it alive; and, as the pot soon acts as a prison, its growth is necessarily impeded: at the same time, every means are used to check its enlargement. The points of the shoots, and the half of every new leaf, are constantly and carefully cut off; the stem and branches, which are allowed to extend only a certain length, are bound and fantastically distorted, by means of wire; the bark is lacerated to produce protuberances, asperities, and cracks; one branch is partly broken through, and allowed to hang down, as if by accident; another is mutilated to represent a dead stump: in short, every exertion of the plant is checked by some studied violence or other. This treatment produces, in course of time, a perfect forest tree in miniature. Stunted and deformed by the above means, it certainly becomes a curious object, bearing all the marks of extreme old age. Its writhed and knotty stem, weather-stained and scabrous bark; its distorted and partly dead branches; its diminutive shoots and leaves; all give it the aspect of antiquity. Various kinds of trees are chosen for this purpose; but the two most commonly met with are the *U'lmus* (campéstris) parvifòlia sinénsis, and a species of *F'icus*, very much like *F.* índica." (*Gard. Mag.*, vol. ii. p. 139.) Grafted standard high on the common English elm, the Chinese elm would form a very handsome small tree. The French name, *Thé de l'Abbé Gallois*, arises from that gentleman, in the reign of Louis XV., having imported this plant from China, supposing it to be the real tea tree. For a very full account of the Chinese mode of dwarfing trees. see *Hort Trans.*, iv. p. 231.

♈ U. *c.* 16 *cucullàta* Hort. has the leaves curiously curved, something like a hood. There is a tree in the Horticultural Society's Garden.

♈ U. *c.* 17 *concavæfòlia* Hort. resembles the preceding kind. There is a tree in the Horticultural Society's Garden.

♈ U. *c.* 18 *fòliis aùreis* Hort. has the leaves variegated with yellow.

Other Varieties. In Messrs. Loddiges's *Catalogue*, ed. 1836, U. *c. nàna*, U. *c. fòliis maculàtis*, U. *dùbia*, U. *viscòsa*, and some others, which are indicated as belonging to this species, are mentioned; but, with the exception of *U.* viscòsa, of which there is a tree in the Horticultural Society's Garden, which, in 1834, after being 10 years planted, was 20 ft. high, we can say very little of them, on account of the small size of the plants.

French Varieties. The following sorts are enumerated in the *Nouveau Cours d'Agriculture*, and in the *Dictionnaire des Eaux et Forêts*; and, though we have not been able to identify all of them with the English kinds, and think it very probable that some of them do not belong to *U.* campéstris, yet we have thought it right to place the names before our readers; in order that collectors of these interesting trees may endeavour to procure them, with a view to adding to the varieties now in cultivation.

L'Orme à Feuilles larges et rudes, the rough broad-leaved Elm.

L'Orme Tell, l'Orme Tilleul, l'Orme de Hollande; the British, or Lime Tree, Elm.—The leaves are not so rough as those of some of the other varieties.

L'Ormille, l'Orme nain, the dwarf Elm, with small, narrow, rough leaves.

L'Orme à Feuilles lisses et glabres, the shining smooth-leaved Elm, has the leaves of a blackish green, leathery, and unequally divided by the midrib.

Le petit Orme à Feuilles panachées de blanc.

L'Orme à Feuilles lisses panachées de blanc, the shining silvery-leaved Elm.

Le petit Orme à Feuilles panachées de jaune, the dwarf golden-leaved Elm.

L'Orme à petites Feuilles, l'Orme mâle, l'Orme pyramidal, the small-leaved Elm, which always grows erect, with the branches close to the trunk.

L'Orme à très-grandes Feuilles, l'Orme femelle, l'Orme de Trianon, the large-leaved Elm, the branches of which spread horizontally. This elm, says Du Hamel, branches much, and furnishes kneed timber, which is very useful to the wheelwright. Its wood, however, is not so strong as that of the twisted elm.

L'Orme de Hollande à grandes Feuilles panachées, the variegated Dutch Elm, has broad variegated leaves.

L'Orme tortillard, ? *U.* tortuòsa *Lodd. Cat.* (see p. 1376.), the twisted Elm.—This is a very distinct variety; and it is one which very frequently comes true from seed. Its leaves are of a very deep green, and about the middle size; its trunk is marked with alternate knots and hollows; and the fibres of its wood are all twisted and interlaced together. This kind of elm presents a very singular appearance when it becomes old, as a number of knots, or bosses, appear to surround its trunk. It produces but few seeds, and some years none at all. Its seeds are, also, much smaller than those of the common elm. It is the best of all the varieties for the use of wheelwrights; and particularly for the spokes of wheels. This elm is very much cultivated in France, at Varennes, in the nurseries near Meaux, and at Amiens. On the road from Meaux to Paris, there is a great number of these trees. Michaux mentions the twisted elm in his *North American Sylva*, 3. p. 96., and strongly recommends it to both English and American planters.

Description, &c. The common English elm is, perhaps, more frequently to be found in the parks and pleasure-grounds of the English nobility and gentry, than any other tree, except the oak. It is of a tall upright habit of growth, with a straight trunk, 4 ft. or 5 ft. in diameter when fully grown, and attaining the height of 60 ft. or 70 ft. or upwards. It has rather slender branches, which are densely clothed with small deep green leaves, somewhat shining on the upper surface, though rough to the touch. These leaves are broad in the middle, and contracted towards each end; being, like those of all the other species of elms, unequal at the base, and doubly dentated; and having a strongly marked midrib, with other equally prominent lateral ribs proceeding from it on each side. The colour of the flowers, which appear before the leaves, varies from a dark red to a dull purple. According to Evelyn, the common elm will produce a load of timber in about 40 years: it does not, however, cease growing, if planted in a favourable situation, neither too dry nor too moist, till it is 100 or 150 years old; and it will live several centuries. Young trees, in the climate of London, will attain the height of 25 ft. or 30 ft. in ten years, of which there are living proofs in the London Horticultural Society's Garden. According to Dr. Walker (*Nat. Hist.*, p. 72.), the English elm, when planted beside the Scotch elm, grows much faster, and produces a greater quantity of timber in the same space of time; though that timber is inferior in colour, hardness, and durability.

Geography. The small-leaved elm is a native of the middle and south of Europe, the west of Asia, and Barbary. In France and Spain, it is found in great abundance; and many botanists consider it a native of England. If not truly indigenous, it appears to have been introduced at a very early period, probably by the Romans, and to have been propagated by art; for, as Pliny observes, it seldom bears seeds to any considerable extent. According to Sir J. E. Smith, it is found wild in woods and hedges in the southern parts of England, particularly in the New Forest, Hampshire, and in Sussex and Norfolk. (See *Eng. Fl.*, ii. p. 20.)

History. The common field elm was known to the ancient Greeks, as it appears evident from Pliny mentioning that the Greeks had two distinct kinds, one inhabiting the mountains, and the other the plains. The Romans, Pliny adds, had four kinds; the mountain, or tall, elm (*U'*lmus *Atínia*, our *U.* campéstris); the Gaulic elm; the elm of Italy, which had its leaves in tufts; and the wild elm. The elm was scarcely known, as an ornamental tree, in France, till the time of Francis I.; and it appears to have been first planted there to adorn public walks, about 1540. (See *Dict. des Eaux et Forêts*, ii. p. 453.) It was afterwards planted largely, particularly in churchyards, by Sully, in the reign of Henry IV.; and, by desire of that king, who, according to Evelyn, expressed a wish to have all the highways in France planted with it, it soon became the tree most generally used for promenades and hedgerows. Many old trees existed at the period of the first French revolution, which were called Sully or Rosni, and Henri Quatre; names that had been given to them apparently to commemorate their illustrious planters. Bosc states that he

himself had seen some of these elms in Burgundy, with trunks from 4 ft. to 5 ft. in diameter, which, though hollow, yet supported heads capable of sheltering some thousands of men. In England, the elm has been planted from time immemorial; and, probably, from the era of the possession of the island by the Romans; though Dr. Walker supposes it to have been brought over at the time of the Crusades. The oldest trees on record are, perhaps, those of Mongewell, in Oxfordshire, which were celebrated in the time of Leland, in the reign of Queen Elizabeth. There may, however, be much older trees; for the elm, being a tree of less national importance than the oak, has never possessed the same attractions for antiquaries. In Scotland, the English elm was hardly known before the union of the two kingdoms. Dr. Walker mentions it, in 1780, as being found nowhere in that country of a large size; but, as already mentioned, promising to afford a much greater quantity of wood than the Scotch elm in the same space of time. He particularises a tree planted in 1771, which, in 1799, was 35 ft. high. In Ireland, the narrow-leaved elm is said, in Mackay's *Flora Hibernica* to be abundant, but scarcely indigenous; and no instances are given of large trees. In the middle and southern states of Germany, it attains a considerable size, as will be seen by our statistics of this tree in foreign countries.

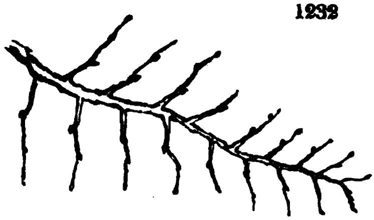
Properties and Uses. The wood of the elm loses a great deal in drying: weighing, when green, nearly 70 lb. the cubic foot; and, when dry, not more than 48½ lb. The wood is of a brownish colour, and is hard and fine-grained. It possesses greater lateral adhesion, and less longitudinal toughness, than that of *U.* montàna, and, consequently, does not crack so much as that sort in drying. In ship-building it is valuable for forming the blocks and dead eyes, and other wooden furniture of rigging, being particularly suitable for these purposes, from its hard and adhesive nature, and indisposition to crack or split when exposed to sun or weather. (See *Matthews on Naval Timber*, &c., p. 57.) The great use of the English elm, however, in ship-building, is for keels. The Norfolk elm is said by Sir J. E. Smith to make the best timber, and to sell for double the price of any other. It is rather remarkable, that Marshall seems of a diametrically opposite opinion; since he says that there is not a single good elm in that county. Sir J. E. Smith adds that, in Norfolk, the elm is generally used for the naves of wheels; and in many parts of England, and particularly about London, it is also employed for coffins. (See *Eng. Fl.*, ii. p. 20.) The knobs which grow upon old trees are divided into thin plates by cabinet-makers, particularly in France and Germany; and, when polished, they exhibit very curious and beautiful arrangements of the fibre, which render this wood extremely ornamental for furniture. A mode is mentioned in the *Museum Rusticum* (vols. i. and ii.) of preparing the wood of the trunk of the elm for cabinet-makers, and giving it the colour of mahogany. This consists in sawing the wood into thin planks, and then boiling it for an hour or more, till all the sap is extracted. The planks are afterwards wiped dry with coarse cloths, and laid in piles, alternately with layers of deal laths, placed across the boards at regular distances; about ten or twelve boards are thus placed one above the other, and a heavy weight put on the last. In this way, the boards dry without warping, and are afterwards washed with aqua fortis, when they are ready for the dye. This consists of two drachms of powdered dragon's blood, one drachm of powdered alkanet root, and half a drachm of aloes. These ingredients are steeped in half a pint of spirits of wine, and the tincture is applied with a sponge, being repeated two or three times, according to the depth of colour required. Elm timber is remarkably durable in water; and it is particularly adapted for piles, pumps, water-pipes, or any other similar purposes. It is generally employed for making the keels of large ships; and, for this purpose, it often sells for a higher price than is obtained for any other kind of timber in the place where it grows. It has been used from time immemorial for water-pipes, or troughs, for conveying the water of the salt springs to the large boxes, or pans, where the watery particles are evaporated by the heat of the sun or by fire, and the salt deposited; and, as it

is well known that our Saxon ancestors called all the places where there were salt springs wich or wych (such as Droitwich, Nantwich, &c.), hence, probably, originated the name of wych elm, which was originally applied to all the British kinds, as well as to *U.* montàna. (See *Hunter's Evelyn*, i. p.114.) As fuel, the wood of the elm is to that of the beech as 1259 to 1540; and, as charcoal, as 1407 is to 1600. (*Hartig.*) The ashes of the elm are rich in alkaline salts; and among the ashes of 73 sorts of trees, the properties of which have been tried, it occupies the tenth place. (*Werneck*). The leaves and young shoots were used by the Romans to feed cattle, and they are still so employed in many parts of France. They have in some places been given to silkworms; and, in both France and Norway, they are boiled to serve as food for pigs. In Russia, the leaves of *U.* c. parvifòlia are used for tea. The bark, is used, in some places, as an astringent medicine; and the inner bark, like that of the lime, for making bast mats and ropes. It is said that both the leaves and bark contain a considerable proportion of glue. Young deer are very fond of this bark; and in Norway they kiln-dry it, and grind it with corn to make flour for bread. The elm was planted by the Romans for the purpose of supporting the vine; and it is still so employed, along with the Lombardy poplar, in the south of Italy. Columella informs us that vineyards, with elm trees as props, were named arbusta, the vines themselves being called arbustivæ vites, to distinguish them from others raised in more confined situations. Once in two years, the elms were carefully pruned, to prevent their leaves from overshadowing the grapes; and this operation being deemed of great importance, Corydon is reproached by Virgil, for the double neglect of suffering both his elms and vines to remain unpruned.

" Semiputata tibi frondosa vitis in ulmo est."
Your vine half-pruned upon the leafy elm.

As a picturesque tree, " the elm," Gilpin observes, " has not so distinct a character as either the oak or the ash. It partakes so much of the oak, that, when it is rough and old, it may easily, at a little distance, be mistaken for one; though the oak (I mean such an oak as is strongly marked with its peculiar character) can never be mistaken for the elm. This is certainly a defect in the elm; for strong characters are a great source of picturesque beauty. This defect, however, appears chiefly in the skeleton of the elm: in full foliage, its character is more marked. No tree is better adapted to receive grand masses of light. In this respect it is superior both to the oak and the ash. Nor is its foliage, shadowing as it is, of the heavy kind. Its leaves are small; and this gives it a natural lightness: it commonly hangs loosely, and is, in general, very picturesque. The elm naturally grows upright, and, when it meets with a soil it loves, rises higher than the generality of trees; and, after it has assumed the dignity and hoary roughness of age, few of its forest brethren (though, properly speaking, it is not a forester) excel it in grandeur and beauty. The elm is the first tree that salutes the early spring with its light and cheerful green; a tint which contrasts agreeably with the oak, whose early leaf has generally more of the olive cast. We see them sometimes in fine harmony together, about the end of April and the beginning of May. We often, also, see the elm planted with the Scotch pine. In the spring, its light green is very discordant with the gloomy hue of its companion; but, as the year advances, the elm leaf takes a darker tint, and unites in harmony with the pine. In autumn, also, the yellow leaf of the elm mixes as kindly with the orange of the beech, the ochre of the oak, and many of the other fading hues of the wood." (*Gilpin's Forest Scenery*, vol. i. p. 43.) " The elm throws out a beautiful bloom, in the form of a spicated ball, about the bigness of a nutmeg, of a dark crimson colour. This bloom sometimes appears in such profusion as to thicken and enrich the spray exceedingly, even to the fulness almost of foliage." (*Ibid.*, p. 114.) " The branch of the elm has neither the strength nor the various abrupt twistings of the oak; nor does it shoot so much in horizontal directions. Such, also, is the spray. (*fig.* 1232.) It has a

1232



more regular appearance, not starting off at right angles, but forming its shoots more acutely with the parent branch; neither does the spray of the elm shoot, like the ash (fig. 1046. in p. 1222.), in regular pairs from the same knot, but in a kind of alternacy. It has generally, at first, a flat appearance; but, as one year's shoot is added to another, it has not strength to support itself; and, as the tree grows old, it often becomes pendent also, like the ash: whereas the toughness and strength of the oak enable it to stretch out its branches horizontally to the very last twig." (*Ibid.*, p. 113.) As an ornamental tree, it is used, both in Britain and on the Continent, more especially in France and Holland, for planting in avenues, particularly in public walks. For this purpose it is well adapted, from the comparative rapidity of its growth in any soil, the straightness of its trunk, the facility with which it bears lopping, the denseness of its foliage, its hardiness, and its longevity. It has also the great advantage of requiring very little pruning, or care of any kind, after it has once been planted. There are many fine avenues of elms in France, particularly those in the Champs Elysées and at Versailles; and in Holland, at the Hague. In England, the principal public elm avenues are in St. James's Park, and at Oxford and Cambridge; but there are also some very fine ones at gentlemen's seats, especially at White Knights, Littlecote Hall, and Strathfieldsaye.

Poetical and historical Allusions. The ancient poets frequently mention this tree, which, in common with many other barren trees, was devoted by them to the infernal gods. The Greeks and Romans considered all the trees which produced no fruit fit for human use as funereal trees. Homer alludes to this when he tells us, in the *Iliad*, that Achilles raised a monument to the father of Andromache in the midst of a grove of elms.

> " Jove's sylvan daughters bade their elms bestow
> A barren shade, and in his honour grow."

Ovid tells us that, when Orpheus returned to earth after his descent into the infernal regions, his lamentations for the loss of Eurydice were so pathetic, that the earth opened, and the elm and other trees sprang up to give him shade. Virgil, in his *Georgics*, mentions that the Roman husbandmen bent the young elms, while growing, into the proper shape for the *buris*, or plough-tail. (See *Georg.* i. ver. 170.) The use, however, which the Romans made of the elm, as a prop to the vine, has given rise to the most numerous allusions to the tree by poets, not only ancient, but modern. Ovid makes Vertumnus allude to it, when he is recommending matrimony to Pomona.

> " ' If that fair elm,' he cried, ' alone should stand,
> No grapes would glow with gold, and tempt the hand;
> Or if that vine without her elm should grow,
> 'Twould creep, a poor neglected shrub, below.' "

Milton, in describing the occupations of Adam and Eve in Paradise, says,—

> ——" They led the vine
> To wed her elm: she, spoused, about him twines
> Her marriageable arms; and with her brings
> Her dower, the adopted clusters, to adorn
> His barren leaves."

Tasso has also alluded to this custom, in the beautiful lines beginning, " Come olmo, a cui la pampinosa pianta," in the 20th canto of *La Gerusalemme Liberata*.

In the early ages of Christianity, the hunters were accustomed to hang the skins of the wolves they had killed in the chase on the elms in the churchyards, as a kind of trophy.

Soil and Situation. " Narrow-leaved English elms," says Mitchell, " abhor

clays, and all moist soils. I saw a line of them at Beaulieu Abbey, in Hampshire, 50 ft. or 60 ft. high, not more than 4 ft. or 5 ft. in circumference; all hollow, from the root to the top, as if they had been bored for water pipes. They grew on a sandy, marly, wet, heathy soil." (*Dendrologia*, p. 36.) "The propriety of planting the elm," Marshall observes, "depends entirely upon the soil: it is the height of folly to plant it upon light sandy soil. There is not, generally speaking, a good elm in the whole county of Norfolk: by the time they arrive at the size of a man's waist, they begin to decay at the heart; and, if not taken at the critical time, they presently become useless as timber. This is the case in all light soils: it is in stiff strong land which the elm delights. It is observable, however, that here it grows comparatively slow. In light land, especially if it be rich, its growth is very rapid; but its wood is light, porous, and of little value, compared with that grown upon strong land, which is of a closer stronger texture, and at the heart will have the colour, and almost the hardness and heaviness, of iron. On such soils the elm becomes profitable, and is one of the four *cardinal trees*, which ought, above all others, to engage the planter's attention; it will bear a very wet situation." (*Planting and Rural Ornament*, ii. p. 431.)

Propagation and Culture. The common elm produces abundance of suckers from the roots, both near and at a great distance from the stem; and throughout Europe these afford the most ready mode of propagation, and that which appears to have been most generally adopted till the establishment of regular commercial nurseries; the suckers being procured from the roots of grown up trees, in hedgerows, parks, or plantations. In Britain, the present mode of propagation is by layers from stools, or by grafting on the *U.* montàna. The layers are made in autumn, or in the course of the winter, and are rooted, or fit to be taken off, in a year. Grafting is generally performed in the whip or splice manner, close to the root, in the spring; and the plants make shoots of 3 ft. or 4 ft. in length the same year. Budding is sometimes performed, but less frequently. On the Continent, plants are very often procured from stools, simply by heaping up earth about the shoots which proceed from them. These shoots root into the earth; and, after growing three or four years, during which time they attain the height of 10 ft. or 15 ft., they are slipped off; and either planted where they are finally to remain, or in nursery lines. When they are transplanted to their final situation, the side shoots are cut off; and the main stem is headed down to the height of 8 ft. or 10 ft.; so that newly planted trees appear nothing more than naked truncheons. The first year, a great many shoots are produced from the upper extremity of each truncheon; and in the autumn of that year, or in the second spring, these shoots are all cut off but one, which soon forms an erect stem, and as regular a headed tree as if no decapitation had previously taken place. (See *Gard. Mag.*, vol. ii. p. 226. and p. 461.; and *Annales de la Soc. d'Hort. de Paris*, t. xviii. p. 360.) This corresponds with Evelyn's recommendation to plant trees about the "scantling of your leg, and to trim off their heads at 5 ft. or 6 ft. in height." Cato recommends 5 or 6 fingers in thickness; adding that you can hardly plant an elm too big, provided you trim the roots, and cut off the head. All the avenues and rows of elm trees in Europe were planted in this manner previously to about the middle of the eighteenth century; and, according to Poiteau (*Ann.*, l. c.), the same practice is still the most general in France. The late Professor Thouin, in his *Cours de Culture* (tom. ii. p. 231.), argued against it, and had some avenues planted in the Jardin des Plantes, without cutting off the heads of the trees; but, besides being found much more expensive, from the necessity of taking up the plants with a greater quantity of roots, transporting them to where they were to be planted with greater care, and preparing a wider pit to receive them, it was found that they grew much slower for the first 3 or 4 years than those that had been decapitated. The only advantage proposed to be gained by planting trees with their heads nearly entire is, that of preserving the centre of their stems from being rotted, in consequence of the water entering at the end made by the decapitation; but

this, it is proved by the practice in Belgium, is only an imaginary evil, provided the superfluous shoots are removed from the upper extremity of the decapitated tree the second year, and the head formed with common care by future prunings. (See the very instructive article by Poiteau, already referred to, in the *Annales*, and also the account of the Belgian practice, in the *Gardener's Magazine*, vol. x. p. 8.) In Britain, young elm trees, having been two or three times transplanted in the nurseries, are placed in their final situations without heading down; and in our moist climate they grow vigorously the first year, and require very little pruning. On the Continent, owing to the greater warmth of the summers, and the consequent increased evaporation from the leaves, plants are liable to be killed when transplanted with all their branches on; and, hence, the mode of denuding the plants just described is that generally practised. In France and Belgium, the narrow-leaved elm is the most common tree planted by road sides, and along the boulevards and streets of towns and cities; and, in such cases, a large pit is previously dug, 4 ft. or 5 ft. in diameter, and from 2 ft. to 3 ft. in depth; and a considerable portion of rich fine mould is placed in immediate contact with the roots of the trees, and the pit filled up with the best part of the soil which had been previously dug out of it. During the first summer, water is regularly supplied; and the trees, or rather stumps, grow freely; very little attention is required afterwards, except to encourage the leading shoot, and to shorten in the lateral branches, so as to encourage the plant to assume a tree-like form. In the neighbourhood of Paris, and in the south of France, *U.* campéstris, and several of its varieties, occasionally bear seeds; and these are sometimes sown by the nurserymen, in order to procure new sorts; and by the managers of the national forests, in order to obtain numerous plants at a cheap rate. The common English elm very rarely produces seeds in England; nevertheless it has done so in a few places, and one of these is Lea Park, near Littlebourne, about four miles from Canterbury. Mr. Masters of Canterbury has only known seeds twice ripened in this park; and one of the times they did not germinate. From those which did he obtained *U.* c. viminàlis, and nearly a score other very distinct varieties, which, however, from the number of varieties already existing, and the little demand for them, he did not consider worth keeping separate, and giving names to. *U.* c. strícta, and some other varieties of the common elm, as well as the species, flower very profusely every year, but scarcely ever ripen seeds.

It is observed by Bosc, that the more remarkable varieties, such as the twisted elm, the broad-leaved elm, the lime-tree-leaved elm, &c., come tolerably true from seed, speaking of the mass of young plants; but that among these are constantly produced numerous subvarieties. The seeds fall from the trees as soon as they are ripe; and, being swept up, are sown immediately in beds of light rich soil; the seeds being placed about 1 in. apart every way, and covered to the depth of about an eighth of an inch. The plants come up the same season, and are fit for transplanting into nursery lines in the autumn. Of all the European timber trees, not belonging to the coniferous family, except the Lombardy poplars, the narrow-leaved elm requires the least care or pruning after it is planted; and, at the same time, no tree will bear better than it does the knife or the shears. All the branches may be cut from the stem, except a small tuft at the top; and still the tree will grow vigorously, affording, where that mode of feeding cattle is considered profitable, an ample crop of branches every three or four years. When headed down to the height of 10 ft. or 12 ft., it is very prolific of branches, as a pollard, and will live and be productive, in this state, for a great number of years. When grown exclusively for the timber of its trunk, however, it requires to be allowed a considerable amplitude of head; perhaps not less than one third of its whole height. The timber, in this case, is found to be far more compact and durable, though not so curiously veined and variously coloured, as it is when the tree is allowed to produce branches from the ground upwards. The timber of the elm, not being remarkable for its durability, is, in old trees, very

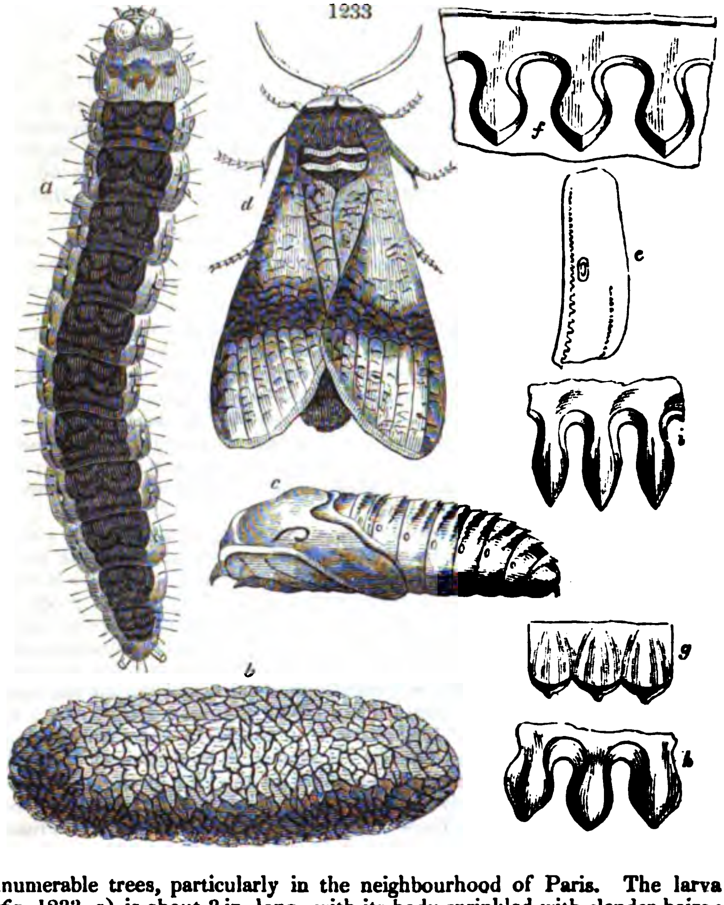
commonly found decayed at the heart; and this is very generally the case, even when the exterior circumference of the trunk is in a healthy and vigorous state, and prolific of branches. The most profitable age for felling the elm is between 70 and 80 years; and, if the trunk is disbarked a year before it is cut down, the wood will be more thoroughly seasoned.

Accidents, Diseases, and Insects. The elm is not a brittle tree; and, from the straightness and strength of its trunk in proportion to its head, it is not liable to be injured by high winds. It is, however, subject to many diseases; and is very liable to be attacked by insects. The principal disease with which it is assailed is, a species of ulceration, "which appears on the body of the tree, at the height of 3 ft. or 4 ft. from the ground, and which discharges a great quantity of sap. The disease penetrates gradually into the interior of the tree, and corrupts its substance. Many attempts have been made to cure it in the beginning, or to arrest its progress, but hitherto without success. The best treatment is to pierce the tree to the depth of 2 in. or 3. in. with an auger, in the very heart of the malady, which is declared by the flowing of the sap." (*Michx.*) The matter discharged by this ulcer has been analysed by M. Vauquelin, and found to contain 0·340 parts of carbonate and sulphate of potash; 0·051 of carbonate of lime; and 1·004 parts of carbonate of magnesia. (*Mém. de l'Institut*, tom. ii.) The mode of treatment recommended in the *Nouveau Cours d'Agriculture* is, to pierce the ulcer, as above advised by Michaux, and then to dress the wound with powdered charcoal, or a mixture of cow-dung and clay. Elms, when in a soil which does not suit them (viz. when it is either excessively wet, or excessively dry), are very subject to a disease called carcinoma. "An unusual deposit of cambium takes place between the wood and the bark: no new wood is formed, but, instead of it, the cambium becomes putrid, and oozes out through the bark, which thus separates from the albumen." (*Lindl. Introd. to Bot.*, p. 298.) This disease shows itself by the extravasated cambium forming long black streaks down the bark, and by its sweetness attracting numerous insects, of several tribes, to prey upon it. Mr. Spence thinks that this disease is very probably caused by the scolyti. "I have seen," he says, "many elms pierced by these insects, where the extravasated cambium partly oozed out in white masses like gum or manna, and partly formed long black streaks down the bark (as described above), and numerous insects were attracted to feed on it."

Many kinds of insects attack the elm. One of these, a species of Háltica (vulgarly called the elm flea, from its habit of leaping), devours the leaves, but is said not to do any serious injury to the tree. (See *Ent. Mag.*, i. p. 427.) It is a beautiful little insect, covered with a brilliant cuirass of green and gold, and having the thighs of its hinder legs so large as to appear almost round. These insects are so lively, and so quick in their movements, that, though a branch may appear covered with them one moment, the next they have all vanished. The larvæ are small and slender, and devour the leaves equally with the perfect insect. (See *Dict. Classique d'Hist. Nat.*, art. Altise; and *Nouv. Cours d'Agric.*, tom. i. p. 256.) In the *Dictionnaire des Eaux et Forêts*, and in the *Nouveau Du Hamel*, it is mentioned that galls, or small bladders, are produced on the leaves of the elm, by the puncture of some kind of insect (probably some species of Cynips), which are first green, but afterwards turn black. These galls each contain some drops of a liquid, which is called, according to Du Hamel, elm balm, and was formerly employed for the cure of recent wounds. In the *Nouveau Cours d'Agriculture*, four insects that feed on the elm are mentioned. The first is the common caterpillar *Bómbyx* chrysorrhœ'a *Fab.*, which destroys the leaf buds and leaves entirely, so as to give the tree, in spring, the appearance of winter. The second is the galeruque de l'orme (Galerúca ulmariénsis *Fab.*), a coleopterous insect, the larvæ of which, in some seasons, entirely destroy the leaves of the elm trees in the public promenades both in England and on the Continent. Mr. Spence mentions that, visiting the boulevards at Rouen, in the summer of 1836, he found the larvæ of this insect had so completely destroyed the leaves of the

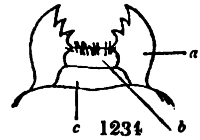
elms planted there, by eating the parenchyma, and leaving the skeleton of the leaves dry and brown, that, at first sight, he supposed they had all been blighted by some neighbouring manufactory of acid. These larvæ are blackish, and exhale, when crushed, a most disagreeable smell. They coil up the moment they are touched, and let themselves fall to the ground. The perfect insect is extremely sluggish in its movements, counterfeiting death, in cases of danger, rather than unfolding its wings to fly away. (See *Dict. Classique d'Hist. Nat.*, art. Galeruque.) It conceals itself in the interstices of the bark, under stones, and between the bricks of walls; and will produce, sometimes, three generations in the course of one summer. The third is a species of *Cóssus* (*Cóssus* Lignipérda *Fab.*), or Goat Moth (*fig.* 1233.), which has destroyed

1233



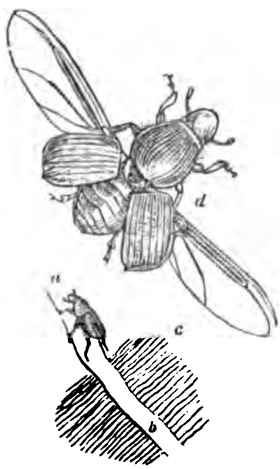
innumerable trees, particularly in the neighbourhood of Paris. The larva (*fig.* 1233. *a*) is about 3 in. long, with its body sprinkled with slender hairs; it is of a reddish brown on the back, becoming yellow beneath, with eight breathing-holes on the sides, and a black head. It exhales a most disagreeable odour, which is produced by an oily and very acrid liquor, which it discharges from its mouth; and the use of which is supposed to be to soften the wood before it devours it. This liquor has a strong scent, like that of a goat, whence the English name of the insect is derived. The pupa (*c*) is brown, the abdominal

segments bearing two rows of spines directed backwards. Before the larva becomes a pupa, it spins a strong web, intermixed with particles of wood, which constitutes its cocoon (*b*); in some instances the larva changes to a pupa under ground. In *fig.* 1233., *e*, *f*, *g*, *h*, and *i* are representations magnified of the spines upon certain of the abdominal segments: *e* represents the 4th abdominal segment seen laterally; *f*, three of the basal row of spines; *g*, three of the hinder row of spines; and *h*, three of the basal row of spines of the 9th abdominal segment. *Fig.* 1234. represents the jaws, or mandibles, of the larva, with which it cuts its way through the wood: in this figure, *a* is the mandible; *b* is the labrum, or upper lip; and *c* shows the clypeus. These mandibles are formidable-looking instruments, each having the appearance of a sort of chisel, with a toothed edge. The perfect insect (*d* in *fig.* 1233.) has dark grey wings, clouded with dark brown, and streaked with black. The imago belongs to the class of insects that fly by night, and it appears about the end of June. The female lays but one course of eggs, but these generally amount to 1000 in number, and are always deposited at the base of the trees; whence the caterpillars penetrate the bark, wherever they can find the easiest entrance. The eggs are small, in proportion to the size of the imago; and the caterpillar, which grows to a large size, is said to remain in the larva state three years. The large size of the larva, Samouelle observes, compared with the smallness of the egg, strengthens this idea, and prepares us to expect that it would be likely to consume a great quantity of wood in the progress of its growth. The smell of the larva is so strong, as to be easily perceived by persons passing near trees infested with it. (*Samouelle.*) The green woodpecker preys upon these caterpillars, and its stomach, on dissection, has an intolerable stench. The principal kinds of tree which the cossus feeds on are, the elm, the alder, the oak, the ash, the walnut, the beech, the lime, and some kinds of willow and poplar. The larvæ devour the liber, or inner bark, making long galleries in the wood, like the insects that attack the pear tree (see p. 886.), and finally destroying the tree. Many remedies have been proposed; but that of Latreille appears to be most approved of in France. This consists in surrounding the base of the tree, where it has been observed that the females always deposit their eggs, with a thick coating of a mixture of clay and cow-dung, which the insects cannot penetrate. For further information respecting this insect, see *Gard. Mag.*, vol. xii. p. 464. The fourth enemy of the elm tree is the scolytus. The S. destrúctor *Oliv.* is generally considered by far the most injurious; but it is assisted in its ravages by another species, the S. armàtus.



1234

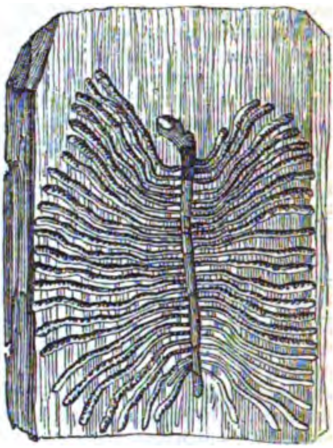
Scólytus destrúctor. The female insect (*fig.* 1235., in which *a* is the natural size, and *d* the insect magnified), about July, bores through the bark, until she has reached the point between the soft wood and the inner bark; she then forms in the latter a vertical channel, usually upwards, of about 2 in. in length, on each side of which she deposits her eggs as she advances, to the number of from 20 to 50 in all. It appears probable that, after doing this, she dies, without making her way out again, as she may be often found dead at the end of the channel. About September, the larvæ are hatched; and they commence feeding upon the matter of the inner bark (*c*), at the edge of the channel (*b*), and, in a very slight degree, on that of the soft wood opposite; advancing, as they feed, in a



1235

course at about right angles from the primary channel, on each side of it. (See *fig.* 1236.) The true food of the insect is the inner bark; and the erosion of the soft wood is so slight, as to be, perhaps, nearly accidental. The course of each individual larva, on each side of the primary channel, is about parallel to that of the larva next to it; and each forms a channel by its feeding that is enlarged as the larva increases in size. When each larva has finished its course of feeding it stops in its progress, turns to a pupa, and then to a beetle; after which it gnaws a straight hole through the bark, and comes out. The beetles begin to come out in about the latter end of May of the year following that in which the eggs were deposited. The sexes afterwards pair, and the females, bearing eggs, bore through the bark, as before detailed; and so on from generation to generation, and year to year.

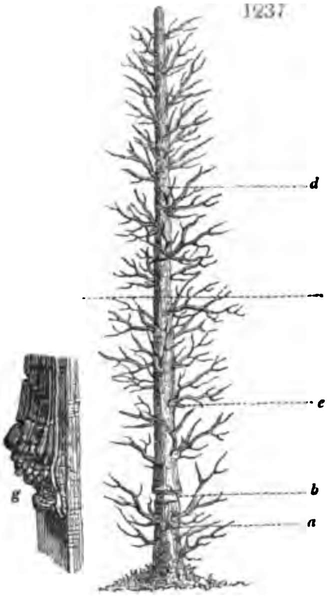
1236



The result of the erosions of the female parent, and of the larva, in the inner bark and soft wood, is that of cutting off the vital connexion between these two parts; and, when the erosions effected in a tree have become numerous, of occasioning its death, by preventing the ascent and descent of the sap. It has been said that the scolytus never attacks a tree in a perfectly healthy state; and, also, that trees suffering under carcinoma (see p. 1385.) are particularly liable to it. In the year 1825, an avenue of elm trees in Camberwell Grove were attacked by this disease, which was supposed to be brought on by the gas which escaped from the pipes laid down along the road being absorbed by the roots; and which gave rise to a suit in Chancery between the inhabitants and the proprietors of the gas-works. Various persons, considered as competent judges, were employed to ascertain the cause of the decay of the elms; and their general conclusion was, that the carcinoma had been brought on by old age, excavations for building in an exceedingly dry soil, and an extraordinarily dry summer, and that the gas had had no influence in producing the decay of the trees. The trunks of the trees, when examined in 1826, were found infested with an immense number of larvæ feeding on the soft inner bark. An interesting account of the Camberwell elms will be found in the *Gardener's Magazine*, vol. i. p. 378. In relation to the capability of the scolytus to effect injury on elm trees, it is stated that 80,000 have been found in a single tree. It has also been remarked that the scolyti seldom destroy the trees they attack the first year that they commence their ravages; and that they prefer a tree that they have already begun to devour, to a young and vigorous tree. (See the observations of Mr. Spence in p. 1389.) It is easy to ascertain the infested trees, as the bark will be found perforated by small holes, as if made by shot or a brad-awl, in various parts; and little particles of a substance like fine sawdust will be found on the rough surface of the bark, and at the foot of the tree. The scolyti, as Mr. Denson, sen., has observed, never attack dead trees. The Scólytus destrúctor, as an enemy to elm trees, appears first to have attracted the attention of entomologists in England about the year 1824, by M'Leay's *Report to the Treasury* upon the state of the elms in St. James's and Hyde Parks. (See this *Report* in *Edin. Phil. Journ.*, No. xxxi. art. 12.; and see Tilloch's *Phil. Mag.*, Oct. 1823, art. 51.) In the year 1828, a controversy was carried on in a Cambridge newspaper, between Mr. John Denson, sen., the author of *A Peasant's Voice to Landowners*, &c., and Mr. J. Deck of Cambridge, respecting the cause of

the death of certain elms in the public walks in that city. Mr. Deck's opinion was, that the trees were destroyed by the insects; and Mr. Denson's, that the trees were only attacked by the insects after they had become injured or diseased. To prove this, Mr. Denson selected in his own garden, in the spring of 1828, a healthy young elm, about 18 ft. high, and 1 ft. in diameter at the surface of the ground. At about 30 in. up the stem, that is, at *b*, *fig*. 1237, he says, "I cut out completely round the stem a band, or ring, of bark, about 4 in. broad, expecting by this act to intercept the passage of the sap to *c d*, and thence to have *c d* in a duly diseased and paralysed state, to be perforated by the scolytus in June or July; while, by retaining *a* alive, and in a growing state, I should be able to witness whether the insect would attack the live part also, or not. Quite contrary to my expectation, *c d* (the tree had been deprived of its head when I adopted it for my experiment) emitted side shoots, and grew as freely through the season of growth, both of 1828 and 1829, as *a*

1237



itself; evincing, indeed, no difference, either from *a*, or other elms standing near it, except that the leaves turned yellow somewhat earlier, and fell somewhat sooner. Too impatient to wait longer, early in 1830, from *c d* I cut off *d*, a piece about 9 ft. long, and placed it near the remainder of the tree; and, to my great gratification, in June, *d* was visited by scolyti, perforated in many places, and, from the eggs then deposited, now (Sept. 9. 1830) teems with larvæ; while *a b c* did not receive a single perforation, and now does not contain a single larva. This result satisfies my mind that the Scólytus destrúctor is altogether guiltless of causing the death of healthy growing trees."

In this controversy, we are informed by William Spence, Esq., F.R.S., who has recently attended to this subject, that both parties, like the knights who quarrelled about the shield with one side of gold and the other of silver, are both right and both wrong. It is quite true, as Mr. Denson maintains, that the female scolyti never deposit their eggs in trees perfectly healthy; but it is equally true, that both they and the males pierce young and healthy trees for the sake of *eating* the inner bark, which constitutes their food; and that the numerous holes which they thus cause, partly from the loss of sap which exudes from them, and partly from the effect of the rain which lodges in them, in a few years bring the trees in which they occur into that incipient state of ill health in which the female selects them for laying her eggs, just as in trees beginning to decay naturally; and thus healthy trees are effectually destroyed by the combined operations, first and last, of the scolyti of both sexes, though not in consequence of the sole deposition of the eggs of the female. That this explanation of the subject, so happily reconciling former apparently contradictory facts, for which those who are interested in the preservation of the elm are indebted to the distinguished naturalist, M. Audouin, professor of entomology at the Muséum d'Histoire Naturelle at Paris, who has recently closely studied the habits of these insects, is correct, Mr. Spence, to whom he communicated it this spring, informs us he has had numerous opportunities of proving in the most satisfactory manner; having, both at

Brussels (where, in consequence of his suggestions to the local authorities, it was found necessary to cut down from 20 to 30 large trees attacked by Scólytus destrúctor in the Park, and from 50 to 60 younger ones in the boulevards), and also during a tour in the north of France this summer (where he found the promenades of elms equally ravaged by the scolyti at Dunkirk, Calais, Boulogne sur Mer, Montreuil, Rouen, Havre de Grace, Caen, St. Lo, Granville, &c.), seen hundreds of young trees in that incipient state of decay indicated by M. Audouin as arising from the attacks of the scolyti simply for food; and great numbers of these in which the females, having found them sufficiently debilitated, had deposited their eggs, and given birth to numerous broods of larvæ, which had caused them to be either dead or fast dying.

It is scarcely possible to overvalue, in an economical point of view, the importance of M. Audouin's discovery, which, if it had been formerly known and acted upon, might have saved the greater part of the fine elms in the promenades in many of the principal cities in the north of Europe, which have fallen victims to the ravages of Scólytus destrúctor, as well as 50,000 young oaks in the Bois de Vincennes, near Paris, which it has been recently necessary to cut down in consequence of the attacks of another insect of the same tribe, S. pygmæ'us. The practical directions to which it leads, in all cases where there is reason to suspect the presence of scolyti, are very simple, and may be briefly expressed as follows: —

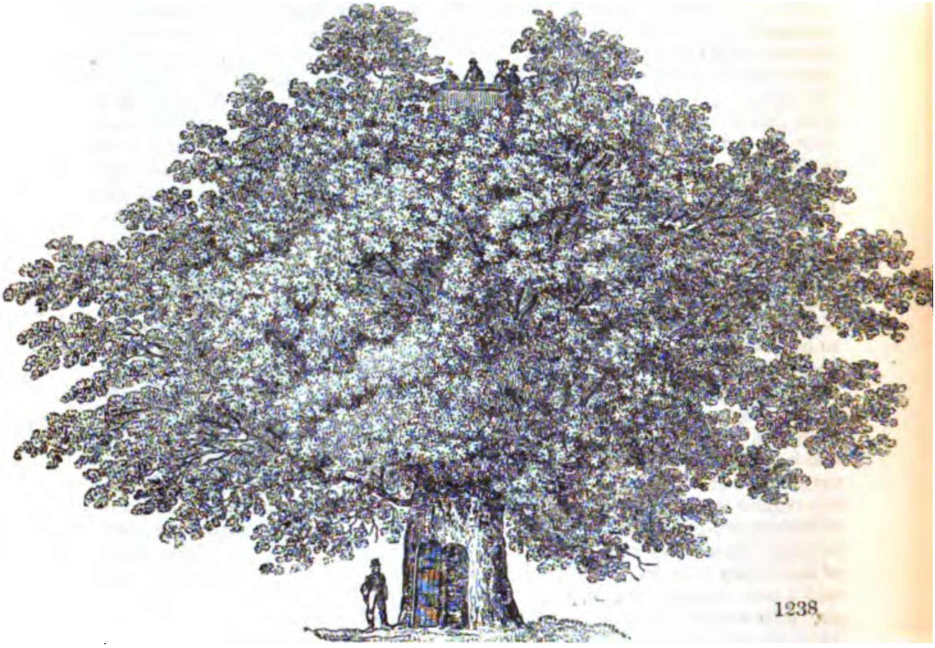
1. The first thing to be done is, to pare away the exterior rough bark with a cooper's spokeshave, or other convenient tool: this admits of a distinct inspection of the actual state of the trees, which, if there is no trace in the inner bark either of small holes in old trees, or of those superficial furrows which the scolyti make for food in young trees (and which may be distinguished from the natural crevices in the bark by their dark-coloured and dead margins), may be pronounced to be in a sound and healthy state, and requiring no further attention.

2. If the inner bark exhibits either of the appearances just mentioned, the next thing to be ascertained is, whether the female has already deposited her eggs in it, and if it contain the larvæ of the scolyti: to know which, it is necessary to cut away portions here and there of the bark down to the actual wood, and examine them; and, if the existence of larvæ be proved, the trees should be cut down, and their bark peeled off, and every fragment of it carefully burnt.

3. Those trees which, though pierced with exterior superficial holes or furrows, have no larvæ in them, are such as have been attacked by the scolyti for food only; and, if they be carefully brushed over with coal tar, the smell of which is highly offensive to the perfect scolyti, there is every probability that they will be secure from the future attacks of the females; and that the repetition of the same process in the spring, for a year or two, would enable them to resume their vigour, and to become healthy trees; for the future fate of which, if, at the same time, the entire removal of all the trees actually diseased has been attended to, there would be no need for apprehension. It is in this way, as we are informed by Mr. Spence, that a great number of the young elm trees in the boulevards at Brussels, brought into an incipient stage of debility by the attacks of the scolyti for food, but not yet attacked by the females, were treated in the spring of 1836 with every prospect of a successful result; though, of course, some years must elapse before any absolute deductions can be drawn from the experiment. The above most important information was communicated to us by Mr. Spence in December, 1836.

Recorded Elms. Evelyn, to prove that the elm attains "a prodigious growth in less than a person's age," mentions a tree which he had seen, "planted by the hand of a countess, living not long since, which was near 12 ft. in compass, and of a height proportionable." He mentions elms, "now standing in good numbers which will bear almost 3 ft. square for more than 40 ft. in height."

"Mine own hands," he adds, "measured a table more than once, of about 5 ft. in breadth, 9½ ft. in length, and 6 in. thick, all entire and clear. This, cut out of a tree felled by my father's order, was made a pastry board.... The incomparable walks at the royal palaces in the neighbourhood of Madrid were planted," he continues, "with this majestic tree." These are said to have been the first elms that were planted in Spain; and Baron Dillon tells us that, when he saw them, about the end of the last century, they were 6 ft. in diameter, and in a healthy state. The plants were taken from England by Philip II., who had married Mary Tudor, daughter of Henry VIII., and Queen of England. Henry IV. of France planted an elm in the gardens of the Luxembourg, in Paris, which stood till it was destroyed during the first French revolution. An elm in Switzerland, near Morges, at the time it was blown down, had a trunk 17 ft. 7 in. in diameter, and was estimated to be 335 years old. Queen Elizabeth is said to have planted an elm at Chelsea, which was cut down in 1745, and sold for a guinea by the lord of the manor, Sir Hans Sloane. It was supposed to have become a nuisance to the public road, close to which it stood, from its great size and age. It was 13 ft. in circumference at the ground, and half as much at the height of 44 ft. Before the hard frost in 1739–40 had injured its top, it was 110 ft. high. The Crawley Elm, which has been figured by Strutt, stands on the high road from London to Brighton. It is 70 ft. high, and the trunk is 61 ft. in circumference at the ground. Its trunk is perforated to the very top; and it measures 35 ft. round the inside at 2 ft. from the base. There is a regular door to the cavity in this tree, the key of which is kept by the lord of the manor; but it is opened on particular occasions, when the neighbours meet to regale themselves within the cavity, which is capable of containing a party of more than a dozen. The floor is paved with bricks. Madame de Genlis says a poor woman gave birth to an infant in the hollow of this tree, where she afterwards resided for a long time A hollow elm stood formerly at Hampstead, but in what spot is uncertain. It was engraved by the celebrated Hollar, in 1653; and *fig.* 1238. is a copy of it from Parke's *Hampstead*, reduced to the scale of 1 in. to 12 ft. "The Great Hollow Elm Tree of Hampstead," as it is called in the engraving, was upwards of 42 ft. high. It was hollow from the ground to the summit, from which the trunk appears to have been abruptly broken off; and in the hollow a wooden stair, or ladder, was formed, which conducted to a turret on the top, containing seats on which six persons might sit. The following quaint description is given on the margin of the engraving: — "1. The bottom above ground, in compass, is 28 foote. 2. The breadth of the doore is 2 foote. 3. The compass of the turret on the top is 34 foote. 4. The doore in height to goe in is 6 foote 2 inches. 8. The height of the turret is 33 foote. 11. The lights into the tree is 16. 18. The stepps to goe up is 42. 19. The seat above the stepps six may sitt on, and round about roome for foureteene moore. All the way you goe up within the hollow tree." (*Parke's Hampstead*, p. 34.) About the time that the engraving was published, a number of rhymes were printed on the subject of this tree, some of them by Robert Codrington; and others were printed by E. Cotes, and were "to be given or sold in the Hollow Tree at Hampstead." Hollar's engraving appears also to have been sold at the tree. Nine elm trees, standing on Hampstead Heath in 1805, were celebrated in a poem by Edward Coxe, Esq., published in that year. (*Ibid.*, p. 40.) In a manuscript lent to Professor Martyn by Craven Ord, Esq., of Purser's Cross, and probably written by Oldys (the translator of *Camden's Britannia*, who died in 1761), mention is made of several remarkable elms. One at Charlton, in Kent, about which it is said Horn Fair was kept, spread 8 yards on every side; the height was about 10 yards, but the trunk not above 1 ft. in diameter. One of Sir Francis Bacon's elms, in Gray's Inn walks, planted in 1600, was felled, upon a suspected decay, in 1720 or 1726, and was 12 ft. round; its head contained 45 ft. of timber. In 1750, not above eight trees of his planting were left. They were planted in 1600. At Fulham are, or were, some elms planted in the time of King Edward VI.; and one at Richmond, said to be planted by



1238

a courtier of King Henry VII., whilst that king kept his court there, and yet (in Oldys's time) in its prime. The row of elms on that side of the Mall in St. James's Park next to the palace are some of them about 160 years of age. One, which stood at the upper end, turning to the Green Park, being blown down, was found to be above 60 ft. in height, and near 12 ft. in circumference near the root. They are now (in 1805) considerably more than 200 years old; but very few are remaining [in 1836, none], and those very much decayed. Two elms, at St. John's College, Oxford, were sizeable trees in the reign of Queen Mary. Stately rows of elms, at Hillhall, in Essex, are said to have been planted by Sir Thomas Smith. (*Mart. Mill.*) On the 29th of November, 1836, some of the largest elms in St. James's Park, and also in Kensington Gardens, were blown down during a tremendous hurricane, which made dreadful havock among large trees in most parts of England. Mr. Coxe, in his account of Monmouthshire, mentions an ancient elm at Ragland Castle, which was 28 ft. 5 in. in circumference near the root (*Ibid.*) Mr. Boutcher informs us that he sold a line of English elms, about 60 in number, at a guinea a tree, at 24 years' growth: they were about 18 in. in diameter at 1 ft. above ground, and 40 ft. high. It is probably the tree mentioned in the above quotation from Martyn's *Miller*, as having been planted by a courtier of Henry VII., that Mr. Jesse alludes to in the 2d series of his *Gleanings*. He says, "At the north-west angle of Richmond Green may now be seen the trunk of an ancient elm, called the Queen's Elm, from having, it is said, been a favourite tree of Queen Elizabeth's. Some kind hand, with equal good taste and feeling, has planted ivy round its naked trunk; and the inhabitants of Richmond, much to their credit, have protected it from injury by surrounding it with a paled fence. The ivy has thriven, and the lately naked trunk is now richly covered with a verdant mantle." (p. 268.) Mr. Jesse also mentions an elm tree in Hampton Court Park, called King Charles's Swing, which, he says, " is curious from its size and shape. At 8 ft. from the ground, it measures 38 ft. in circumference.... It is, perhaps, not

generally known, that one of the elm trees standing near the entrance of the passage leading to Spring Gardens was planted by the Duke of Gloucester, brother to Charles I. As that unfortunate monarch was walking with his guards from St. James's to Whitehall, on the morning of his execution, he turned to one of his attendants, and mentioned the circumstance, at the same time pointing out the tree." (*Jesse's Glean.*, 2d series, p. 273.)

Piffe's Elm, in the Vale of Gloucester, between Cheltenham and Tewkesbury, was, in 1783, the finest tree of the species in the county. It was then measured by Marshall, and found to girt 16 ft. at the smallest part of the trunk. It was between 70 ft. and 80 ft. high, and its head proportionably wide.

The Chipstead Elm, in Kent, figured by Strutt, was 60 ft. high, and contained 268 ft. of timber. Its trunk was covered with ivy, and the tree appeared very luxuriant when Mr. Strutt made his drawing; but, in the spring of 1836, as we were informed by J. Polhill, Esq., the tree did not put forth its leaves, and it stood throughout the following summer a leafless trunk. The elms at Mongewell, in Oxfordshire, a place celebrated by Leland for its "faire woodes," are also engraved by Strutt. The largest is 79 ft. high, 14 ft. in circumference at 3 ft. from the ground, the diameter of the head 65 ft., and it contains 250 ft. of solid timber. About the centre of a group of these elms stands an urn, inscribed to the memory of two highly valued friends of the possessor in 1830, who was the Bishop of Durham; and whom, Mr. Strutt observes, "it was delightful to contemplate wandering, in his 90th year, amidst shades with which he was almost coeval, and which in freshness and tranquillity afforded most suitable emblems of his own green and venerable old age." In Ireland, the dimensions of several elms are recorded by Hayes, which, though the species is not named, we think belong to *U.* campéstris. Near Arklow, at Shelton, an elm had a trunk 5 ft. 4 in. in diameter at the surface of the ground. At Luttrelstown, an elm by the road side girted 18 ft. 10 in. at the ground, and had a straight trunk 40 ft. high. In the county of Kildare stood an elm, which, till the year 1762, was, perhaps, the finest tree of the species in the world. The diameter of the head, taken from the extremities of the lower branches, exceeded 34 yards; but in the end of that year the two principal arms fell from the trunk in one night, apparently from their own weight, as the weather was perfectly calm. The timber contained in these branches alone sold for 5 guineas. In this situation the tree continued till the winter of 1776, when a violent storm tore up the whole by the roots, with a great mass of soil and rock adhering to them. Some time previous to this the trunk had been carefully measured, and was found to be 38 ft. 6 in. in circumference. It had been hollow for some years; and the value of its timber by no means answered what might have been expected from the sale of its two branches in 1762. We have nothing certain as to its age; but tradition supposes it to have been planted by the monks of St. Wolstan, some time before the dissolution of that monastery, which happened in the year 1538. An elm at Carton, the seat of the Duke of Leinster, is 14 ft. 8 in. round near the bottom, diminishing like the shaft of a Doric column, and being 13 ft. in circumference at 16 ft. from the ground, and containing 169 cubic feet of timber.

Statistics. Existing Trees. U'lmus campéstris in the Environs of London. At Ham House, Essex, it is 88 ft. high, diameter of the trunk 6 ft., and of the head 73 ft. In the Fulham Nursery, 70 years planted, it is 60 ft. high. At York House, Twickenham, 120 years planted, it is 90 ft. high, diameter of the trunk 3½ ft., and of the head 60 ft.

U'lmus campéstris South of London. In Devonshire, at Killerton, 200 years planted, it is 100 ft. high, diameter of the trunk 7 ft. 3 in., and of the head 62 ft.; at Muswell Hill, it is 77 ft. high, with a trunk 1 ft. in diameter. In Dorsetshire, at Melbury Park, 200 years old, it is 125 ft. high, diameter of the trunk 6 ft. 9 in., and of the head 80 ft. In Hampshire, at Alresford, 81 years planted, it is 73 ft. high, diameter of the trunk 4 ft. 4 in., and of the head 48 ft.; at Strathfieldsaye, 130 ft. high, the diameter of the trunk 5½ ft., and of the head 72 ft. In the Isle of Wight, in Wilkins's Nursery, 35 years old, it is 50 ft. high. In Somersetshire, at Leigh Court, it is 90 ft. high, diameter of the trunk 5½ ft., and of the head 60 ft.; another, 14 years planted, is 50 ft. high: at Nettlecombe, 210 years old, it is 100 ft. high, diameter of the trunk 5 ft. 8 in., and of the head 57 ft. In Surrey, at Farnham Castle, it is 96 ft. high, diameter of the trunk 7 ft. 9 in., and of the head 85 ft.; at St. Anne's Hill, it is 82 ft. high, diameter of the trunk 4 ft. 8 in., and of the head 64 ft.; at Claremont, it is 100 ft. high, diameter of the trunk 6 ft., and of the head 85 ft. In Sussex, at Cowdry, it is 45 ft. high, diameter of the trunk 4 ft. 10 in.; and at Parham Park, there are some fine specimens. In Wiltshire, at Wardour Castle, 50 years planted, it is 70 ft. high, diameter of the trunk 5 ft., and of the head 42 ft.

U. campéstris North of London. In Bedfordshire, at Flitwick House, it is 60 ft. high, with a trunk

5 ft. 10 in. in diameter. In Berkshire, at Bearwood, 16 years planted, it is 40 ft. high, diameter of the trunk 8 in., and of the head 18 ft. In Buckinghamshire, at Temple House, 40 years planted, it is 50 ft. high; diameter of the trunk 2 ft., and of the head 40 ft. In Denbighshire, at Llanbede Hall, 70 years planted, it is 54 ft. high, diameter of the trunk 3½ ft., and of the head 48 ft. In Flintshire, at Gredington, it is 72 ft. high, and the diameter of the trunk 3 ft. 9 in. In Gloucestershire, at Doddington Park, it is 90 ft. high, diameter of the trunk 7 ft., and of the head 249 ft. In Herefordshire, at Croft Castle, it is 95 ft. high, diameter of the trunk 6 ft., and of the head 60 ft.; at Eastnor Castle, 18 years planted, it is 55 ft. high; at Rotherwas, the old tree represented in *fig.* 1239. to a scale of 1 in. to 50 ft., from a drawing kindly sent to us by Mr. Hay Brown, gardener at Stoke Edith Park, near Ledbury. In Hertfordshire, at Hatfield, is one 48 ft. in girt, containing 493 cubic feet of timber. In Leicestershire, at Donnington, 100 years old, it is 92 ft. high, diameter of the trunk 7½ ft., and of the head 94 ft. In Oxfordshire, at Tew, 16 years planted, it is 52 ft. high. The plantations here have been made with great care by the proprietor, Matthew Bolton, Esq.; and the success has been most extraordinary, as may be seen by the returns of the different species. In Pembrokeshire, at Stoakpole Court, 70 years old, it is 85 ft. high. In Radnorshire, at Maeslaugh Castle, 50 years planted, it is 70 ft. high, diameter of the trunk 3 ft. 8 in., and of the head 60 ft. In Shropshire, at Hardwicke Grange, 11 years planted, it is 36 ft. high; at Willey Park, 15 years planted, it is 43 ft. high. In Warwickshire, at Coombe Abbey, 200 years old, it is 150 ft. high, diameter of the trunk 9 ft. 6 in., and of the head 74 ft.; at Whitley Abbey, 7 years planted, it is 16 ft. high. In Worcestershire, at Hadzor House, 10 years planted, it is 25 ft. high; at Croome, 100 years old, it is 115 ft. high, diameter of the trunk 7 ft., and of the head 10 ft.; at Hagley, 12 years planted, it is 32 ft. high. In Yorkshire, at Studley Park, it is 108 ft. high; at Hornby Castle, it is 84 ft. high, with a trunk 3 ft. in diameter; at Castle Harwood, nine elm trees in Roywood average nearly 100 cubic feet of timber each (see *Gard. Mag.*, vol. xi. p. 17.); at Sprotborough Hall, there is an elm 80 ft. high, diameter of the trunk 5½ ft., and of the head 115 ft., which is said to be the finest in England.

1239



U. *campéstris in the Environs of Edinburgh.* At Newbattle Abbey, it is 75 ft. high, diameterof the trunk 6 ft. 4 in., and of the head 74 ft.; at Cramond House, it is 70 ft. high, diameter of the trunk 4 ft., and of the head 54 ft.; at Dalmeny Park, it is 80 ft. high, the diameter of the trunk 4 ft., and of the head 66 ft.; at Barnton House, it is 90 ft. high, the diameter of the trunk 3 ft. 3 in., and of the head 80 ft.; another is 100 ft. high, with a trunk 4½ ft. in diameter; at Gogar House, it is 80 ft. high, diameter of the trunk 4 ft., and of the head 60 ft.

U. *campéstris South of Edinburgh.* In Ayrshire, at Kilkerran, 75 years planted, it is 90 ft. high, diameter of the trunk 3 ft., and of the head 42 ft. In Kircudbright, at St. Mary's Isle, it is 80 ft. high, diameter of the trunk 4 ft., and of the head 84 ft. In Haddingtonshire, at Yester, 100 years planted, it is 98 ft. high, diameter of the trunk 3 ft. 9 in., and of the head 63 ft.; at Tynningham, it is 46 ft. high, diameter of the trunk 3 ft. 5 in., and of the head 48 ft. In Renfrewshire, at Erskine House, it is 60 ft. high, diameter of the trunk 4 ft. 5 in., and of the head 60 ft.; at Bothwell Castle, it is 86 ft. high, diameter of the trunk 5 ft., and of the head 98 ft.

U. *campéstris North of Edinburgh.* In Banffshire, at Gordon Castle, it is 86 ft. high, diameter of the trunk 3 ft. 4 in., and of the head 75 ft.; at Cullen House, it is 89 ft. high, diameter of the trunk 3 ft., and of the head 90 ft. In Fifeshire, at Dysart House, is one 70 ft. high, with a trunk 2 ft. in diameter, and that of the head 36 ft.; at Wemyss Castle, it is 90 ft. high, diameter of the trunk 9 ft. 3 in., and of the head 51 ft. In Forfarshire, at Cortachy Castle, 102 years old, it is 70 ft. high, diameter of the trunk 2½ ft., and of the head 45 ft. In Perthshire, at Taymouth, 20 years planted, it is 36 ft. high; another is 100 years old, and 40 ft. high, diameter of the trunk 6 ft., and of the head 75 ft. In Ross-shire, at Brahan Castle, it is 75 ft. high, diameter of the trunk 4 ft., and of the head 60 ft.

U. *campéstris in Ireland.* In the Glasnevin Botanic Garden, 30 years planted, it is 50 ft. high, the diameter of the trunk 1½ ft., and of the head 20 ft.; at Terenure, it is 50 ft. high, diameter of the trunk 2½ ft., and of the head 45 ft. In Kilkenny, at Mount Juliet, it is 102 ft. high, diameter of the trunk 4 ft. 2 in., and of the head 32 ft. In King's County, at Charleville Forest, 45 years planted, it is 85 ft. high, diameter of the trunk 4 ft. 8 in., and of the head 65 ft. In the county of Down, at Mount Stewart, 50 years planted, it is 56 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 38 ft.; at Ballyleady, 100 years old, it is 40 ft. high. In Fermanagh, at Florence Court, 60 years planted, it is 70 ft. high. In Galway, at Coole, it is 60 ft. high, diameter of the trunk 2 ft., and of the head 45 ft. In Sligo, at Makree Castle, it is 90 ft. high, diameter of the trunk 3½ ft., and of the head 40 ft.

U. *campéstris in France.* At Nantes, in the nursery of M. De Nerrières, 80 years old, it is 70 ft. high, the diameter of the trunk 6 ft.; in the Botanic Garden at Avranches, 40 years old, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 20 ft.

U. *campéstris in Germany.* In Saxony, at Wörlitz, 60 years old, it is 50 ft. high, with a trunk 3 ft. in diameter. In Bavaria, in the Botanic Garden, Munich, 84 years old, it is 50 ft. high, with a trunk 1 ft. in diameter. In Austria, at Vienna, in the Laxenburg Garden, 100 years old, it is 40 ft. high, the diameter of the trunk 1½ ft., and of the head 20 ft.; at Kopenzel, 40 years old, it is 36 ft. high, the diameter of the trunk 1 ft., and of the head 18 ft.; at Hadersdorf, in the garden of Baron Loudon, 40 years old, it is 30 ft. high, with a trunk 14 in. in diameter, and the diameter of the head 18 ft. In Prussia, at Berlin, in the Botanic Garden, 50 years old, it is 40 ft high, the diameter of the trunk 28 in., and of the head 24 ft.; in the Pfauen Insel, 43 years old, it is 42 ft. high, the diameter of the trunk 14 in., and of the head 30 ft.

U. *campéstris in Italy.* In Lombardy, at Monza, 29 years planted, it is 75 ft. high; the diameter of the trunk 1 ft. 9 in., and of the head 45 ft.

Commercial Statistics. Plants, in the London nurseries, from 3 ft. to 4 ft. high are 20*s.* per hundred, from 5 ft. to 6 ft. high 36*s.*; the striped-leaved variety 50*s.* per hundred. At Bollwyller, large plants are 1 franc each; and at New York, 37½ cents.

♀ 2. *U.* (C.) SUBERO'SA *Mœnch.* The cork-*barked* Elm.

Identification. Ehr. Arb., 142.; Willd. Sp. Pl., p. 1324.; Baumz., 391.; Host Fl. Austr., 1. p. 328.; Eng. Bot., t. 2161.; Engl. Fl., 2. p. 21.; Hook. Br. Fl., p. 141.; Lindl. Synop., p. 226.; Mackay Fl. Hibern., pt. 1. p. 241.; Lodd. Cat., ed. 1836.

Synonymes. *U.* campéstris *Woodv. Med. Bot.*, t. 197.; *U.* campéstris and Theophrásti Du Ham. Arb., 2. p. 367. t. 108.; *U.* vulgatíssima fòlio làto scàbra *Ger. Emac.*, 1480. f., *Raii Syn.*, 468.; *U.* montàna *Cam. Epit.*, t. 70., upper fig.; common Elm Tree, *Hunt. Evel. Syl.*, p. 119; l'Orme Liège, l'Orme fungeux, *Fr.*

Engravings. Eng. Bot., t. 2161.; Hayne, t. 28.; Wood. Med. Bot., t. 197.; Du Ham. Arb., 2. t. 108.; Math. Valgr., 1. p. 130. f.; our *fig.* 1240.; and the plate in our last Volume.

Spec. Char., &c. Leaves pointed, rough, doubly and sharply serrated. Flowers stalked, 4—5-cleft. Samara almost orbicular, deeply cloven, glabrous. Branches spreading; their bark corky. (*Smith Eng. Fl.*) Taller and more spreading than the common English elm. Bark, when a year old, covered with very fine dense cork, in deep fissures; whence the specific name, suberòsa, first given by Mœnch, and adopted by Ehrhart. Leaves rough on both sides, more rounded, and twice or thrice as large as in *U.* campéstris; very unequal at the base, strongly, sharply, and doubly serrated, hairy beneath, with dense broad tufts at the origin of the transverse ribs. Flowers much earlier than the foliage, stalked, reddish, with 4 or 5 rounded segments, and as many stamens, with dull purple anthers. Samara nearly orbicular, with a deep sinus reaching to the place of the seed. (*Sm. Engl. Fl.*) A very marked kind of elm, but evidently a variety of *U.* campéstris; and we should have included it among the varieties of that species, had there not been some very distinct subvarieties of it, which, we think, may be more conveniently kept by themselves; and because we should, for the same reason, have been obliged to include *U.* màjor, also, under *U.* campéstris, it being, in our opinion, as much a variety of that species as *U.* suberòsa. It varies exceedingly in the character of its corky bark; sometimes being deeply furrowed, and sometimes much less so. It also varies much in the character of its head; being sometimes low, loose, and spreading, as represented in the plate in our last Volume; and sometimes being tall and narrow. It is propagated by grafting on *U.* montàna, or by layers or suckers.



1240

Varieties.

- ♀ U. (*c.*) *s.* 1 *vulgaris*, *U.* suberòsa *Hort. Dur.* The Dutch cork-barked Elm. — This, except the American elm and the Canterbury seedling (*U.* montàna màjor glàbra), is the quickest-growing of any that Mr. Masters cultivates. It is, moreover, valuable, on account of its growing well upon the Kentish chalks; and it keeps its leaf till late in the autumn. It is a tree of large growth: many of the elms at Windsor are of this kind.
- ♀ U. (*c.*) *s.* 2 *fòliis variegàtis* Lodd. Cat., ed. 1836; *U.* suberòsa variegàta *Hort. Dur.*; is precisely like the last, except in its variegation. Mr. Masters has seen a few of very large dimensions; and there is one in the grounds of G. May, Esq., Strood House, Herne, remarkable for its size and beauty.
- ♀ U. (*c.*) *s.* 3 *álba*, *U.* suberòsa álba *Masters.* — A lower tree, of more compact growth, than the two preceding varieties; and often growing into an oval, or rather cone-shaped, head. Young shoots pubescent. Foliage thickly set. Bark much wrinkled, and becoming white with age. Fine specimens of this are growing in Lee Park, near Canterbury.

♀ U. (*c.*) *s.* 4 *erécta* Lodd. Cat., ed. 183 has a tall narrow head, resembling that of the Cornish elm; but differing from that tree in having much broader leaves, and a corky bark.

♀ U. (*c.*) *s.* 5 *var.* The broad-leaved Hertfordshire Elm, *Wood*, nurseryman at Huntingdon. — The shoots show some tendency to become corky, which, in our opinion, determines this variety to belong to *U.* (c.) suberòsa, rather than to *U.* montàna or *U.* (m.) glabra.

♀ U. (*c.*) *s.* 6 *var.* The narrow-leaved Hertfordshire Elm, *Wood.* — Leaves and shoots differing very little from those of *U.* campéstris.

Statistics. The largest trees of *U.* (*c.*) suberòsa, in the environs of London, are at Hampstead, in different small gardens, and in Kensington Gardens. In Dorsetshire, at Melbury Park, trees, 30 years planted, are 50 ft. high. In Pembrokeshire, at Stackpole Court, a tree, 50 years planted, is 40 ft. high. In Shropshire, at Kinlet, there is a tree 102 ft. high; the diameter of the trunk is 56 in., and of the head 55 ft. In Scotland, in Clackmannanshire, in the garden of the Dollar Institution, a tree, 12 years planted, is 30 ft. high; the diameter of the trunk 12 in., and of the head 12 ft. In Cromarty, at Coul, it is 28 ft. high; the diameter of the trunk 1½ ft., and of the head 20 ft. In Forfarshire, at Monboddo, 70 years planted, it is 45 ft. high. In Ireland, near Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 40 ft. high. In Hanover, at Göttingen, in] the Botanic Garden, 30 years planted, it is 60 ft. high. In Bavaria, in the Munich Botanic Garden, 24 years planted, it is 50 ft. high, with a trunk 15 in. in diameter. In Austria, near Vienna, at Kopenzel, 24 years planted, it is 18 ft. high. In Prussia, at Berlin, in the Botanic Garden, 14 years planted, it is 36 ft. high; the diameter of the trunk 15 in., and of the head 9 ft. In Italy, at Monza, 29 years planted, it is 70 ft. high; the diameter of the trunk 1½ ft., and of the head 40 ft.

Commercial Statistics. Price of plants, in the London nurseries, transplanted, 3 ft. high, 50*s.* per thousand; at Bollwyller, 1 franc each, and the variegated variety 2 francs; at New York, 75 cents.

♀ 3. *U.* (c.) MA'JOR *Smith.* The greater, *or Dutch cork-barked*, Elm.

Identification. Sm. Engl. Bot., t. 2542.; Sm. Engl. Fl., 2. p. 21.; Hook. Br. Fl., p. 142.; Lindl. Synops., p. 226.; Host Fl. Austr., 1. p. 328.; Lodd. Cat., ed. 1836.

Synonymes. *U.* hollándica *Mill. Dict.*, ed. 8. No. 5.; *U.* màjor hollándica, &c., *Pluk. Alm.*, 393.; *U.* màjor, ampliòre fòlio, &c., *Du Ham. Arb.*, 2. p. 368.; Tília más *Matth. Valgr.*, 1. 158. f., *Cam. Epit.*, 92. f.; *U.* latifòlia *Michx. N. Amer. Syl.*, 3. t. 129. f. 2.

Engravings. Engl. Bot., t. 2542.; Cam. Epit., 92. f.: N. Amer. Syl., 3. t. 129. f. 2.; our *fig.* 1241.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves rough, unequally and rather bluntly serrated. Flowers nearly sessile, 4-cleft. Samara obovate, slightly cloven, glabrous. Branches drooping, their bark corky. (*Smith.*) The branches spread widely, in a drooping manner, and their bark is rugged, and much more corky than even the foregoing. Leaves on short thick stalks, larger and more bluntly serrated than the last; rough on both sides, especially beneath; but the hairy tufts at the origin of each transverse rib are very small. Segments of the calyx short and rounded. Stamens 4. Samara obovate, with a very small rounded sinus, not reaching half so far as the seed. (*Id.*) This appears to be the kind brought over by William III. from Holland; which, from its quick growth, was, at first, much used for hedges, and formal rows of clipped trees; but, when the Dutch taste in gardening declined, the tree was no longer cultivated; as its wood was found very inferior to that of most other kinds of elm. The elm trees in the old part of Kensington Gardens, near the palace, are of this kind: many of them are upwards of 70 ft. in height; and a number, which have been blown down in different winters since 1816, were constantly found rotten at the heart. The Dutch elm is propagated by layers, and grafting on the *U.* montàna. Price as of the preceding kind.



1241

♀ 4. *U.* CARPINIFO'LIA *Lindl.* The Hornbeam-leaved Elm.

Identification. Lindl. Synop., p. 226.; Hook. Brit. Fl., p. 142.

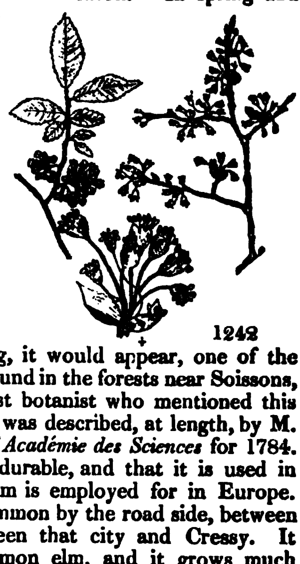
Spec. Char., &c. Leaves ovate-acuminate, coriaceous, strongly veined, simply crenate, serrated, slightly oblique and cordate at the base; shining, but rather scabrous above; smooth beneath. Branches bright brown, and nearly smooth. Samara — ? A tree. (*Lindl.*) The locality which Lindley has quoted for this is:—"Four miles from Stratford on Avon, on the road to Alcester." We have not seen a plant of this sort.

⸸ 5. *U.* EFFU'SA *Willd.* The spreading-*branched* Elm.

Identification. Willd. Arb., 393.; Sp. Pl., 1. p. 1325.; Spreng. Syst. Veg., 1. p. 930.; Roem. et Schult. Syst. Veg., 6. p. 300.; Rees's Cyclo., No. 6.; Fl. Franc., 3. p. 316.; Duby et Dec. Bot. Gall., 1. p. 422.
Synonymes. *U.* ciliàta *Ehrh. Arb.*, 72., *Sm. Engl. Fl.*, 2. p. 23., incidentally; *U.* pedunculàta *Lam. Dict.*, No. 2., *Suppl.*, 4. p. 187.; *U.* octándra *Schk. Bot. Handb.*, 178. t. 67.; *U.* fòlio latíssimo, &c., *Buxb. Hal.*, 340.; *U.* læ'vis *Pal. Ross.*, vol. 1. p. 75.; l'Orme pédonculé, *Fr.*
Engravings. Schk. Handb., t. 57.; Hayne, t. 29.; our *fig.* 1242.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves mostly resembling those of the *U.* montàna, but quite smooth on the upper side; unequal at the base, doubly serrated. Flowers on drooping stalks. Stamens in a flower 6—8. Samara elliptic, deeply cloven, strongly fringed with coarse dense hairs. (*Smith* in *Rees's Cycl.*, and in *Eng. Fl.*) A native of Europe, chiefly in the south of France, and in the Caucasus; flowering in April and May. When it was introduced is uncertain.

Description, &c. This species is very distinct, even when the tree is bare of leaves, as will be seen by comparing the winter tree of it, in our last Volume, with that of *U.* montàna màjor depicted at the same season. In spring and summer, it is equally marked by the long drooping peduncles of its flowers, and its hairy samaras. It expands its leaves, according to M. De Foucault, at least three weeks sooner than any other kind of elm, and a month sooner than some of the varieties. Its leaves are large, and of a beautiful light shining green. The trunk resembles that of *U.* montàna more than that of *U.* campéstris; forming numerous branches, and a spreading head. The buds are long, sharply pointed, and greenish; while in the *U.* campéstris they are short, obtuse, and covered with greyish hairs. (*Annales Forestières* for 1811.) It is a native of Russia, where it becomes a large tree; and has a much wider



1242

geographical range than, *U.* campéstris, being, it would appear, one of the hardiest of European elms; and it has been found in the forests near Soissons, and in some other parts of France. The first botanist who mentioned this tree was Pallas; and, about the same time, it was described, at length, by M. Fougeroux de Bondaroy, in the *Mémoires de l'Académie des Sciences* for 1784. Pallas states that the wood is very hard and durable, and that it is used in Russia for all the purposes that the common elm is employed for in Europe. Bondaroy says that this sort of elm is very common by the road side, between Villars Cotterets and Paris; and also between that city and Cressy. It comes into leaf 15 or 20 days before the common elm, and it grows much faster. The head is more spreading than that of the common elm; and its bark, instead of being furrowed, is smooth. On the whole, he says, the trees are so different in their general appearance, that they may be readily distinguished from each other, even without their leaves. The colour of the young wood, the buds, and the size, colour, and serrature of the leaves, are remarkably like those of the Huntingdon elm; from which circumstance this species is probably more nearly allied to *U.* montàna than to *U.* campéstris. As a tree of ornament, it is well worth cultivating for the beauty of its leaves, for the distinct character of its spray in winter, and, indeed, for its general appearance at all seasons. In British nurseries, it is propagated by grafting on *U.* montàna. There are handsome young trees of it in the London Horticultural Society's Garden; and there is a tree of it at White Knights, in front of the mansion, which is 63 ft. high, the diameter of the trunk 22 in., and of the head 70 ft. This tree, we are informed by the gardener, Mr. Ward, flowers, but does not ripen seeds, on which account it would appear to be allied to *U.* campéstris; but, though its roots run very near the surface, it never throws up a single sucker, and hence it would seem to belong rather to *U.* montàna. There are plants at Messrs. Loddiges's.

♃ 6. *U.* MONTA'NA *Bauh.* The mountain, *Scotch, or Wych*, Elm.

Identification. Bauh. Pin., 427.; With. Bot., 279.; Sm. Engl. Bot., t. 1887.; Engl. Fl., 2. p. 22.; Hook. Brit. Fl., p. 142.; Lindl. Synop., p. 227.; Mackay's Fl. Hibern. Pl., 1. p. 241.; Lodd. Cat., ed. 1836.

Synonymes. *U.* glàbra *Huds.*, ed. 1., 95.; *U.* effùsa *Sibth.*, 87., *Abbot*, 55.; *U.* scàbra *Mill. Dict.*, No. 2.; *U.* nùda *Ehrh.*; *U.* campéstre *Willd. Sp. Pl.*, p. 1324., *Fl. Dan.*, t. 632., *Huds.*, 109., *Lightfoot*, 1094.; Wych Hazel of old authors.

Engravings. Engl. Bot., t. 1887.; Fl. Dan., t. 632.; and the plates of some of the varieties in our last Volume.

Spec. Char., &c. Leaves pointed, rough, broad, and doubly serrated. Flowers on longish peduncles loosely tufted, 5—6-cleft. Samara somewhat orbicular, slightly cloven, naked. Branches drooping at their extremities; their bark smooth and even. (*Smith*, adapted.) A tree, a native of Britain, and of various parts of Europe; flowering in April and May, and ripening its seeds in June.

Varieties. The varieties of the Scotch elm are extremely distinct, and very handsome trees, some well worth cultivating in a useful, and others in an ornamental, point of view.

A. *Timber Trees.*

♃ U. *m.* 1 *vulgàris.*—Tree spreading; seldom exceeding 40 ft. or 50 ft. in height, except when drawn up by other trees.

♃ U. *m.* 2 *rugòsa* Masters, *U.* rugòsa *Lodd. Cat.*, ed. 1836.—Bark reddish brown, cracking into short regular pieces, very like that of *A'*cer campéstre. Tree of spreading growth, and moderate size. A tree with this name attached to it, in the London Horticultural Society's Garden, has much smaller and rougher leaves than the species, and they are of a deeper green. The tree is of upright growth, and is, probably, not identical with the *U.* m. rugòsa of Mr. Masters.

♃ U. *m.* 3 *màjor* Masters.—The tree is of upright and rapid growth, with few branches; and, in some stages, approaching the habit of the common Scotch elm, but of a more tapering form. The leaves fall almost a month sooner than those of the following sort. There is a very handsome tree of this variety in the Horticultural Society's Garden, which we have figured in our last Volume, and which we have no doubt is identical with the kind described by Mr. Masters. It loses its leaves, in the Horticultural Society's Garden, before any other species or variety.

♃ U. *m.* 4 *mìnor* Masters, as compared with *U.* m. màjor, is of a more branching and spreading habit, of lower growth, with more twiggy shoots; and these are more densely clothed with leaves, which are retained long in the autumn.

♃ U. *m.* 5 *cebennénsis* Hort. *The Cevennes Elm.*—There is a tree of this variety in the Horticultural Society's Garden, which, in 1834, was 12 ft. high, after being 10 years planted. Its habit is spreading, like that of *U.* m. vulgàris; but it appears of much less vigorous growth.

♃ U. *m.* 6 *nìgra*, *U.* nìgra *Lodd. Cat.*, *the black* Irish *Elm*, is a spreading tree, with the habit of *U.* montàna vulgàris, but with much smaller leaves. It is by some considered as a variety of *U.* campéstris; but, as it ripens seeds in Ireland, we are inclined to think it belongs to what may be called the seed-bearing section of the genus, and, consequently, to *U.* montàna.

♃ U. *m.* 7 *austràlis* Hort.— The tree of this variety in the Horticultural Society's Garden has rather smaller leaves, and a more pendulous habit of growth, than the species; but it does not appear to be different in any other respect.

B. *Ornamental or curious Varieties.*

♃ U. *m.* 8 *péndula*; *U.* péndula *Lodd. Cat.*, ed. 1836; *U.* glàbra decúmbens *Hort. Dur.*; *U.* horizontàlis *Hort.*; *U.* rùbra in the Horticultural Society's Garden; and the plate of this tree in our last Volume.—

This is a beautiful highly characteristic tree, generally growing to one side, spreading its branches in a fan-like manner, and stretching them out sometimes horizontally, and at other times almost perpendicularly downwards, so that the head of the tree exhibits great variety of shape. By some, this variety is considered to belong to an American species of elm; but from its large rough leaves, its vigorous young wood and large buds, and, above all, from its flowering at the same time as *U.* montàna, and, like it, ripening abundance of seeds, which no American elm whatever does in Europe, we have not a doubt that it is a variety of *U.* montàna. For particular situations in artificial scenery it is admirably adapted: for example, for attracting the eye, and fixing it, in order to draw it away from some object which cannot be concealed, but which it is not desirable should attract notice. There is a handsome tree of this variety in the Hammersmith Nursery, where, after being 12 years planted, it is 30 ft. high. One in the Horticultural Society's Garden was, in 1834, after being 10 years planted, 26 ft. high.

♈ U. *m.* 9 *fastigiàta* Hort., *U.* glàbra replicàta *Hort. Dur.*, *U.* Fórdii Hort., *U.* exoniénsis Hort., and the plate in our last Volume. The Exeter Elm, Ford's Elm.—A very remarkable variety, with peculiarly twisted leaves, and a very fastigiate habit of growth. The leaves, which are very harsh, feather-nerved, and retain their deep green till they fall off, enfold one side of the shoots. The whole habit of growth of of *U.* m. fastigiàta is remarkable; and it forms a singular cup-shaped tree, that cannot be mistaken for any other. Its foliage is darker than that of any other elm, save that of *U.* c. vìrens. (See p. 1376.) This variety was raised at Exeter, by Mr. Ford, nurseryman there, about 1826. It is of less vigorous growth than the preceding varieties; but, being of a very marked character, it well deserves a place in collections. There is a handsome tree of this variety, 16 ft. high, in the Horticultural Society's Garden, and plants in most English nurseries.

♈ U. *m.* 10 *críspa*, ? *U.* críspa *Willd.* *The curled*-leaved *Elm.*—The tree of this variety in the Horticultural Society's Garden is 8 ft. or 10 ft. high, and rather of a slender and stunted habit of growth.

Other Varieties. Several might be taken from catalogues, both timber trees and curious plants; but the former, such as *U.* montàna vegèta *Lindl.*, we think may be best classed under *U.* m. glàbra, and the latter are of so little merit, that we hardly think them worth recording in this work. (See *Lodd. Cat.*, ed. 1836.)

Description, &c. The Scotch elm has not so upright a trunk as the English elm; and it soon divides into long, widely spreading, somewhat drooping branches, forming a large spreading tree. It is "of quicker growth than *U.* campéstris; and the wood is, consequently, far inferior in hardness and compactness, and more liable to split. The branches are, in some individuals, quite pendulous, like the weeping willow. Their bark is even; downy in a young state. Leaves larger than any of the foregoing; broadly elliptical, with a longer copiously serrated point; rough on the upper surface, with minute, callous, bristly tubercles, but less harsh than most of the preceding; the under surface downy and paler, with straight, parallel, transverse ribs, copiously hairy at their origins and subdivisions. Flowers rather larger and paler, in looser tufts than most of the species; each in 5, 6, or 7 oblong-acute segments, and as many broad, rather heart-shaped, dark purple anthers. Capsule broadly obovate or elliptical, and almost orbicular, with a shallow notch at the end, not extending half way to the seed." A native of the northern and temperate parts of Europe. (*Watson.*) It is found in numerous places in Britain; and is the most common elm in Scotland and Ireland. From the leaves somewhat resembling those of the hazel, Gerard tells us that, in Hampshire, "it is commonly called the witch hasell. Old men affirm," he adds, "that, when

long bows were in use, there were very many made of the wood of this tree; for which purpose, it is mentioned in the English statutes by this name of witch hasell." (*Ger. Emac.*, p. 1480.)

It is only within the present century that this tree has been much planted in England, though in Scotland and Ireland its timber has long been considered as next in value to that of the oak; and it has, accordingly, been extensively introduced into artificial plantations. It is very remarkable that this species seems to be altogether unknown in France and Germany; neither being mentioned in the *Nouveau Du Hamel*, the *Nouveau Cours d'Agriculture*, the *Dictionnaire des Eaux et Forêts*, the *Flore Française*, nor even in Willdenow's *Baumzucht*, as far as we have seen in the Continental nurserymen's catalogues, and with the exception of that of Booth of Hamburgh; though, by the American catalogues, it appears to have been introduced into that country. It may possibly, however, be known on the Continent as a variety of *U.* campéstris, that species being given as synonymous with it in Smith's *English Flora*, on the authority of several authors. Indeed some botanists are of opinion that the *U.* campéstris of Linnæus is the *U.* montàna of modern botanists. Among the trees of France *U'*lmus montàna *Bauh.* is included, but this, Mirbel, in his *Nouveau Du Hamel*, makes synonymous with the Dutch elm (*U.* màjor), and with *U.* effùsa *Willd.* Sir J. E. Smith, however, considers Bauhin's figure as representing *U.* montàna, and as the *U.* montàna cebennénsis is a native of the south of France, we may safely assume the species as being indigenous throughout Europe generally, though not under our name of *U.* montàna.

Properties and Uses. The wych elm, according to Gerard, was applied to various uses in ancient times. It was not only made into bows, but its bark, which is so tough that it will strip or peel off from the wood from one end of a bough to the other without breaking, was made into ropes. The wood was not considered so good for naves as the wood of the common elm, which then, as now, was esteemed superior in toughness and strength, though the wood of the wych elm cleaved better. In Scotland, where the tree abounds, both naturally and in artificial plantations, it weighs less than the wood of the English elm, and is more coarse-grained. Nevertheless, Sang observes, "it is always prized next to the wood of the oak." "It is used," he adds, "by the ship-builder, the boat-builder, the block and pump maker, the cartwright, the cabinet-maker, and the coachmaker." The timber, Matthews observes, has much sap-wood, and great longitudinal toughness; but, from the great quantity of sap-wood, and want of lateral adhesion, it splits considerably when dry. The tree has a peculiar fan-like spread of the branches, often tending to one side, and most perceptible in young trees. Hence the tree, when grown up, "has generally a slight bending in the stem, which renders it very fitting for floor-timbers of vessels; the only part of a ship, except the bottom plank, to which it is applicable, as it soon decays above water. Its great toughness and strength, however, render it fit for floors." (*On Naval Timber*, &c., p. 52.) "The tree," Matthews continues, "when come to some size, on the primary branches being lopped off, like the common elm and the oak, often throws out a brush of twigs from the stem; and these twigs impeding the transit of the sap, the brush increases, and the stem thickens considerably, in consequence of a warty-like deposit of wood forming at the root of the twigs. This excrescence, when of size, after being seasoned in some cool moist place, such as the north reentering angle of a building exposed to the dripping from the roof, forms a richer veneer for cabinet-work than any other timber." (*Ibid.*, p. 53.) But, even without this process, the wood has often a curious laced appearance, which renders it fit for beautiful cabinet-work. A writer in the *Gardener's Magazine* (Mr. Ashworth of Prestwich, near Manchester,) states the timber of the Scotch elm to be nearly equal in value to that of the ash. "It is good," he says, "for the naves, poles, and shafts of gigs and other carriages; and, from its not splintering, as the oak and the ash do, in time of battle, for swingle-trees of great gun carriages. It is also used for

dyers' and printers' rollers; the wood, by constant use, wearing smooth. Cartwrights employ it for shafts, naves, beds, rails, and standards for wheelbarrows; and the handles of spades, forks, and other agricultural implements." The price of the wood of *U.* campéstris is from 1*s.* to 1*s.* 4*d.* per cubic foot, and that of *U.* montàna is from 1*s.* 8*d.* to 2*s.* Young plants of the former, 6 ft. high, are 6*d.* each; but of the latter, only 12*s.* per hundred. (Vol. xii. p. 409.) As an ornamental tree, Sang observes, "the Scotch elm cannot be termed beautiful; but, certainly, an aged elm, when standing singly, is a very capital object. In the form of its branches, and its general outline, it much resembles the oak. Hence, in many of the recently improved places in Scotland (where this tree chiefly abounds), it has been reserved as an ornamental tree, and, in this particular, is an excellent substitute for the oak. Even where the oak and the chestnut abound (as at Alva), the Scotch elm maintains its place, with excellent effect, as a park tree." (*Sang's Pl. Cal.*, p. 86.) Gilpin says of the wych elm, that it "is, perhaps, generally more picturesque than the common sort, as it hangs more negligently, though, at the same time, with this negligence, it loses in a good degree that happy surface for catching masses of light which we admire in the common elm. We observe, also, when we see this tree in company with the common elm, that its bark is somewhat of a lighter hue. The wych elm is a native of Scotland, where it is found, not only in the plains and valleys of the Lowlands, but is hardy enough to climb the steeps, and flourish in the remotest Highlands; though it does not attain, in those climates, the size which it attains in England. Naturalists suppose the wych elm to be the only species of this tree which is indigenous to our island." (*Gilpin's Forest Scenery*, vol. i. p. 44.) On this passage, Sir Thomas Dick Lauder observes, "We are disposed to think that Mr. Gilpin hardly does justice to this elm. For our parts, we consider the wych, or Scottish, elm as one of the most beautiful trees in our British sylva. The trunk is so bold and picturesque in form, covered, as it frequently is, with huge excrescences; the limbs and branches are so free and graceful in their growth; and the foliage is so rich, without being leafy or clumpy as a whole; and the head is, generally, so finely massed, and yet so well broken, as to render it one of the noblest of park trees; and, when it grows wildly amid the rocky scenery of its native Scotland, there is no tree which assumes so great or so pleasing a variety of character." (*Lauder's Gilpin*, i. p. 91.) One of the most common uses of this tree, in British nurseries, is as a stock for the different sorts of English and American elms.

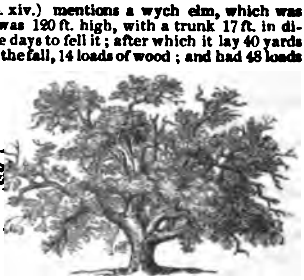
Popular Superstitions. In many parts of the country, the wych elm, or witch hazel, as it is still occasionally called, is considered a preservative against witches; probably from the coincidence between the words wych and witch. In some of the midland counties, even to the present day, a little cavity is made in the churn, to receive a small portion of witch hazel, without which the dairy-maids imagine that they would not be able to get the butter to come.

Soil and Situation. "The Scotch elm," Sang observes, "accommodates itself, both in a natural state and when planted, to many different soils and situations. The soil in which it most luxuriates is a deep rich loam; but that in which it becomes most valuable, is a sandy loam, lying on rubble stone, or on dry rock. It is frequently found flourishing by the sides of rivers or streams, which sometimes wash part of its roots; yet it will not endure stagnant moisture. In wet tilly clays, as at Panmure in Forfarshire, it soon sickens. On bleak hills, among rocks, and where soil is hardly perceptible, its roots will often find nourishment, and the tree will arrive at a considerable size. In a mixture of loam and clay schistus, incumbent on whinstone rock, as at Alva, it arrives at a large size within a century." (*Plant. Cal.*, p. 56.)

Propagation and Culture. The Scotch elm does not produce suckers like the English elm; but, according to Boutcher, it roots more readily from layers than that species. The most ready mode of propagating it, however, is by seeds, which are produced in great abundance, and are ripe about the middle

of June. They ought to be gathered with the hand before they drop, as from their lightness and winged appendages, they are very apt to be blown away by the wind. The seeds may either be sown as soon as gathered, in which case, many plants will come up the same season; or they may be thinly spread out to dry in the shade, and afterwards put up into bags or boxes, and kept in a dry place till the following March or April. Sang directs the seeds to be chosen from the tallest and most erect and healthy trees; on the sound principle, that plants, like animals, convey to their progeny their appearance and habits, whether good or bad. Trees, therefore, though having abundance of seeds, if they be either visibly diseased, or ill formed, should be passed over by the collector. Elm seeds should be gathered the moment they are ripe, which is readily known by their beginning to fall. If the gathering is delayed for a single day, the seed is liable to be blown off, and scattered by the slightest gale. (*Plant. Cal.*, p. 412.) The seeds, whether sown immediately when gathered, or in the following spring, ought to be deposited in light or friable rich soil, and very thinly, in order that the plants that rise from them may be strong and vigorous. If they rise too thickly the first year, they are for several years after sensibly affected, continuing weak, although carefully thinned out. The best form in which the seed can be deposited is in beds; and the covering of soil should not be more than ½ in. thick. (*Id.*, p. 283.) The plants may be transplanted into nursery lines, either at the age of one or two years; and they may be grafted the following spring. If not intended to be grafted, they may go through a regular course of nursery culture, till they have attained the desired height; and they will transplant readily at 20 ft. or 25 ft., though not nearly so well at that size as the *U.* campéstris. Few plants succeed more readily by grafting than the elm; so much so, that when the graft is made close to the surface of the soil, and the scion tied on with matting, the mere earthing up of the plants from the soil in the intervals between the rows will serve as a substitute for claying. The graft, in our opinion, should always be made 6 in. or 8 in. above the collar, in order to lessen the risk of the scion, when it becomes a tree, throwing out roots; which, in the case of all the varieties of *U.* campéstris, would become troublesome by their suckers.

Statistics. Recorded Trees. Cook (*Forest Trees*, pref. p. xiv.) mentions a wych elm, which was felled in Sir Walter Bagot's Park, in Staffordshire, which was 120 ft. high, with a trunk 17 ft. in diameter at the surface of the ground. It required two men five days to fell it; after which it lay 40 yards in length, and was at the stool 17 ft. in diameter. It broke, in the fall, 14 loads of wood; and had 48 loads in the head. It yielded 8 pairs of naves; 8660 ft. of boards and planks; and the whole was esteemed to weigh 97 tons. The Tutbury wych elm is mentioned, in Shaw's *Staffordshire*, as forming a magnificent feature, both in the near and distant prospect. Strutt, who has given an engraving of this tree, of which *fig.* 1243. is a reduced copy, to the scale of 1 in. to 50 ft. describes it as having a trunk 12 ft. long, and 16 ft. 9 in. in circumference at the height of 5 ft. from the ground. The trunk divides, at the height of 12 ft., into 8 noble branches, which are nearly 50 ft. high, and extend between 50 ft. and 60 ft. from the centre of the tree, which contained 689 cubic feet of timber. This tree exists still, and the dimensions and contents given by Strutt have been confirmed to us by Thomas Turner, Esq., Sudbury. The wych elm at Bagot's Mill is also figured by Strutt (p. 68.), who says that it is a tree more remarkable for its beauty than its size. The largest elms which are known certainly to belong to the species *U.* montàna are supposed to be in Scotland. The following dimensions are taken from Sang's *Planter's Calendar*; and the reader may rely on their being of trees of the true *U.* montàna. On the estate of Castle Huntly, there are several fine Scotch elms, which girt, at 3 ft. from the ground, about 11 ft. At Lord Morton's, Aberdour, Fife, there is a Scotch elm, which measured, March 10. 1812, 40 ft. length of bole, and in girt 11 ft. 6 in. Two elms, at Yair, in Selkirkshire, girt each, at the surface of the ground, 13 ft. An elm tree, in the parish of Roxburgh, in Teviotdale, called the Trysting Tree, was measured in 1796; and its girt, at 4 ft. from the surface of the ground, was 30 ft. An elm, on the lawn at Taymouth Castle, girted, in September, 1814, 15 ft. 9 in. (*Sang's Nicol's Plant. Cal.*, p. 549.) In Ireland, the wych, or native Irish elm, appears to grow with great vigour. Hayes mentions six trees, produced from layers from the stole of a tree felled for that purpose, which in 26 years girted from 3 ft. 11 in. to 4 ft. 9 in. at 5 ft. from the ground. Three out of these six trees would thus, at 26 years' growth, cut into 12 in. planks. (*Pract. Hints on Plant.*, p. 162.) A Scotch elm, remarkable for its fantastic boughs, is figured in Monteith's *Forester's Guide*, pl. 12., and said to stand on the estate of Touch, Stirlingshire. "My reason for giving a figure of this tree," says Monteith, "is, that it proves to demonstration the different crooks and shapes that, by a timely attention to the growth of trees, they could be brought to grow to. The crooked branch of this tree had evidently once been the main stem; but was kept down, I am told, by children swinging upon it when young. Hence it has, as will be seen by looking at the dimensions, been brought to form

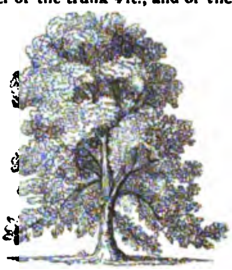


1243

crooks nearly equal in largeness to the bole of the tree. This tree affords a very great natural curiosity to the eye of a lover of trees. (*For. Guide*, p. 392.)

Statistics of existing Trees In England. At Muswell Hill, it is 85 ft. high, the diameter of the trunk 3 ft., and of the head 45 ft. In Hampshire, at Alresford, 81 years planted, it is 72 ft. high, diameter of the trunk 2 ft. 5 in., and of the head 36 ft. In the Isle of Wight, in Wilkins's Nursery, it is 25 ft. high. In Somersetshire, at Nettlecombe, 40 years planted, it is 65 ft. high, the diameter of the trunk 1 ft. 11 in., and of the head 26 ft.; In Surrey, at Farnham Castle, it is 80 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 86 ft.; at St. Anne's Hill, it is 70 ft. high, diameter of trunk 4 ft., and of the head 99 ft. In Bedfordshire, at Woburn Abbey, is one with a trunk 6½ ft., and the diameter of the head 92 ft. In Monmouthshire, at Dowlais House, 20 years old, it is 30 ft. high. In Oxfordshire, in the Oxford Botanic Garden, it is 100 ft. high, diameter of the trunk 2 ft. 10 in., and of the head 120 ft. In Worcestershire, at Cromme, 70 years planted, it is 70 ft. high, diameter of the trunk 4 ft., and of the head 28 ft.; at Hagley, 10 years planted, it is 14 ft. high. In Yorkshire, at Grimstone, 12 years planted, it is 24 ft. high.

U. montàna in Scotland. In the Horticultural Garden, Inverleith, 29 years planted, it is 18 ft. high; at Hopetoun House, 100 years planted, it is 60 ft. high, diameter of the trunk 4 ft., and of the head 51 ft. In Clackmannanshire, in the garden of the Dollar Institution, 12 years planted, it is 30 ft. high, diameter of the trunk 1 ft., and of the head 24 ft. In Lanarkshire, at Pollock, are some very large wych elms, one of which figured by Strutt in 1812 was then 86 ft. high, but in October, 1839, it was again measured for this work, and was found 90 ft. high, the diameter of the trunk nearly 4 ft., at 5 ft. from the ground. There are three other elms at Pollock nearly as large; and one which is reported to have been planted by Sir Thomas Maxwell, lord advocate of William III., and one of the commissioners of the union, and which must consequently be upwards of 180 years old. In Perthshire, at Kinfauns Castle, it is 70 ft. high, diameter of the trunk 6½ ft., and of the head 60 ft. A sketch of this tree was sent us by Mr. Robertson, gardener at Kinfauns Castle, of which *fig.* 1244. is an engraving, reduced to the scale of 1 in. to 50 ft. In Stirlingshire, at Airthrey Castle, it is 63 ft. high, diameter of the trunk 4 ft., and of the head 48 ft.; at Callender Park, it is 46 ft. high, diameter of the trunk 5 ft., and of the head 66 ft.



1244

U. montàna in Ireland. In Cork, at Castle Freke, it is 50 ft. high, diameter of the trunk 1 ft. 3 in., and of the head 32 ft. In Louth, near Mansfieldstown, at Bawn, a tree planted to commemorate the birth of the grandfather of the present proprietor, and which is considered to be of about 120 years' growth, is 70 ft. high; the diameter of the trunk at the base 9 ft. 8 in., at 6 ft. from the ground 5 ft. 4 in., and the diameter of the head 90 ft.

Commercial Statistics. Plants, in the London nurseries, are, seedlings 5*s.* per thousand; transplanted seedlings, from 1 ft. to 2 ft. high, 15*s.* per thousand; from 2 ft. to 3 ft. high, 25*s.* per thousand; from 4 ft. to 6 ft. high, 50*s.* per thousand. At Bollwyller, large plants are 1 franc each; and at New York, they are 5 cents each.

♀ 7. *U.* (M.) GLA'BRA *Mill.* The smooth-*leaved, or Wych*, Elm.

Identification. Mill. Dict., ed. 8., No. 4.; Cullum, 97.; Engl. Bot., t. 2248.; Sm. Engl. Fl., 2. p. 23.; Hook. Br. Fl., p. 142.; Lindl. Synop., p. 226.; Mackay Fl. Hibern., pt. 1. p. 241.
Synonymes. *U.* montàna β *Fl. Br.*, 282.; *Hull.*, ed. 2., 75., *U.* fòlio glàbro *Ger. Emac.*, 1481. f., *Raii Syn.*, 469.; *U.* campéstris var. 3. *With.* 279.; the feathered Elm.
Engravings. Engl. Bot., t. 2248.; Ger. Emac., 1481. f.; and our *fig.* 1245.

Spec. Char., &c. Leaves elliptic-oblong, doubly serrated, smooth. Flowers nearly sessile, 5-cleft. Samara obovate, naked, deeply cloven. (*Smith.*) A tall elegant tree, with spreading, rather drooping, smooth, blackish branches, scarcely downy in their earliest stage of growth. Leaves smaller than any of the preceding (except *U.* campéstris), as well as more oblong; strongly serrated, very unequal at the base, not elongated at the extremity; their substance firm, or rather rigid; the surface of both sides very smooth to the touch, and without any hairs beneath, except the axillary pubescence of the ribs, which often forms a narrow downy line along the midrib. Flowers nearly sessile, with 5 short, bluntish, fringed segments, and as many longish stamens; the anthers of which are roundish heart-shaped. Samara smaller than most other species, obovate, cloven down to the seed, smooth, often reddish. A native of Britain, chiefly in England, in woods and hedges; and forming the most common elm in some parts of Essex. It bears seeds in nearly as great abundance as *U.* montàna, and it does not throw up suckers; which convinces us that it is only a variety of that species. The propagation, culture, &c., of *U.* glàbra and its varieties are the same as in the preceding sort; but, to preserve the latter distinct, they ought to be grafted.



1245

Varieties. In consequence of *U.* glàbra ripening seeds in different parts of England, many varieties have been raised from it, most of which are distinguished by great rapidity of growth. From the specimens that have been sent to us from the Canterbury, Huntingdon, and other nurseries, and also from the trees in the Horticultural Society's Garden, it is difficult to determine, in every case, whether the varieties of *U.* (m.) glàbra are not nearer to *U.* montàna or *U.* americàna, than to that sub-species; and, in some instances, they appear to partake of the character of *U.* campéstris and *U.* (c.) suberòsa. T. A. Knight, Esq., informs us that from seeds of one variety of *U.* (m.) glàbra, viz. the Downton elm, which were ripened in the cold climate of that part of Shropshire, he "raised plants which are so perfectly similar to the *U.* suberòsa, and which approximate so nearly to the character of the *U.* glàbra, that" he does "not doubt but that the *U.* campéstris, *U.* suberòsa, *U.* glàbra, and three or four other varieties which" he has "seen in different parts of England, are all varieties only of the same species."

A. *Timber Trees.*

¥ U. (*m.*) *g.* 1 *vulgàris. The common* smooth-leaved *Elm.*

¥ U. (*m.*) *g.* 2 *vegèta*; *U.* montàna vegèta in the Horticultural Society's Garden; *U.* americàna *Masters*. The Huntingdon Elm, the Chichester Elm, the American Elm in some places, and, perhaps, the Scampston Elm. — This is by far the most vigorous-growing kind of elm propagated in British nurseries, often making shoots from 6 ft. to 10 ft. in length in one season; and the tree attaining the height of upwards of 30 ft. in 10 years from the graft. Having written to Huntingdon, Chichester, York, Newcastle, and various other places, respecting this elm, we have received the following information from Mr. John Wood, nurseryman, near Huntingdon, dated November, 1836. — "The Huntingdon elm," he says, "was raised here about 80 or 90 years ago, by an uncle of mine, from seed collected in this neighbourhood. I have sent many plants of it all over the country; and it has been given out from Norwich, Bristol, and other places, under the name of the Chichester elm; but you may rely on my word that the Chichester elm and the Huntingdon elm are one and the same thing. The tree is the fastest grower, and produces the best timber, of all the elms. I have lately cut down some trees planted about 40 years ago, and have used the planks in various ways in house-building." The young shoots of this elm sent to us by Mr. Wood were 9 ft. long; and those sent to us by Mr. Masters, under the name of the American elm, which he considers as a synonyme to the Huntingdon elm, were about the same length. We also observed that the shoots of *U.* campéstris álba *Masters*, and of *U.* c. acutifòlia *Masters*, strongly resemble those of the Huntingdon elm. The tree marked as the Huntingdon elm in the Horticultural Society's Garden was, in 1834, 35 ft. high, after being 10 years planted.

¥ U. (*m.*) *g.* 3 *var.* The Scampston Elm. — The earliest notice which we can find of this tree is in the *Agricultural Report for the County of Durham*, published in 1810; and in which it is said that the Scampston elm comes from a place of that name in Yorkshire, but is supposed to be originally from America. It is said to be a plant of wonderfully quick growth, having made shoots from grafts, in one year, of 5 ft. or 6 ft. in length. From the tree bearing this name in the Horticultural Society's Garden, which, in 1834, was 18 ft. high, after being 8 years planted, it is clearly some variety of *U.* glàbra, and very little different from the species.

¥ U. (*m.*) *g.* 4 *major*, *U.* glàbra màjor *Hort. Dur.*, the Canterbury Seedling, is of more vigorous growth than the species, and, indeed, is a rival to *U.* americàna and the Huntingdon elm, in quickness of growth.

It preserves its foliage long after *U.* (m.) glàbra; and its bark is like that of the Huntingdon elm. This tree is also more spreading than that sort. Judging from the specimens of this variety sent to us by Mr. Masters, we should say that it belongs fully as much to *U.* montàna as to *U.* (m.) glàbra.

♀ U. (*m.*) *g.* 5 *glandulòsa* Lindl. — Leaves very glandular beneath.

♀ U. (*m.*) *g.* 6 *latifòlia* Lindl. — Leaves oblong, acute, very broad.

♀ U. (*m.*) *g.* 7 *microphýlla* H. S. — The tree of this variety in the Horticultural Society's Garden is 40 ft. high, and bears a considerable resemblance to *U.* campéstris; but is evidently of the *U.* montàna family. A tree in the Horticultural Society's Garden, marked U. *g. parvifòlia* (from Germany), seems to us identical with this variety.

B. *Ornamental or curious Trees.*

♀ U. (*m.*) *g.* 8 *péndula*, *U.* campéstris péndula *Hort. Dur.*, the Downton Elm, was raised in Smith's Nursery, at Worcester, Mr. Smith states, in 1810, from seeds obtained from a tree in Nottinghamshire. Mr. Knight of Downton Castle purchased some of these trees; and one of them turned out to be that weeping variety which has since obtained the name of the Downton elm. On writing to Mr. Smith, to endeavour to get some information respecting the trees that produced the seed, he informs us in answer, that, after making every enquiry in Nottinghamshire respecting these trees, he finds " they were a mixture of wych and English: probably they were all planted as English; but, being grafted trees, and being planted by the side of a public road, they might have been broken off at the graft when young. At any rate, the plants produced from the seeds were a complete mixture of the English and wych elms, both by their leaves and their manner of growth. The original trees in Nottinghamshire have been long since cut down, and the ground built upon. The plants which I raised," he adds, " not meeting with a ready sale, I grafted them with the common English elm, which is more in demand in this neighbourhood." Mr. Knight observes that " the Downton elm is more remarkable for the singularity of its form and growth, than for its value as a timber tree." There is a tree of this variety in the Horticultural Society's Garden 23 ft. high, the branches of which are somewhat pendulous.

♀ U. (*m.*) *g.* 9 *variegàta* H. S. has variegated leaves.

♀ U. (*m.*) *g.* 10 *ramulòsa* Booth. — We have not seen this variety lately; but there were plants of it in the Horticultural Society's Garden some years ago; and we suppose it still exists in the Floetbeck Nurseries.

Statistics. Young trees of *U'*lmus glàbra in the Horticultural Society's Garden, which, in 1834, had been 10 years planted, were between 30 ft and 40 ft. high. In Dorsetshire, at Melbury Park, 40 years planted, it is 66 ft. high; diameter of the trunk 2 ft., and of the head 44 ft. In Staffordshire, at Trentham, 26 years planted, it is 34 ft. high. In Yorkshire, at Grimston, 14 years planted, it is 25 ft. high. In Perthshire, at Taymouth, 160 years planted, it is 100 ft. high; diameter of the trunk 8 ft., and of the head 90 ft. In Germany, in the Botanic Garden, Göttingen, it is 30 ft. high, with a trunk 1 ft. in diameter.

Commercial Statistics. Plants of the Huntingdon elm, in the London nurseries, from 4 ft. to 5 ft. high (that is, one year grafted), are 25*s.* per hundred; from 7 ft. to 9 ft. high (that is, 2 years from the graft), 50*s.* per hundred.

♀ 8. *U.* A'LBA *Kit.* The whitish-*leaved* Elm.

Identification. Kitaib., quoted in Rœm. et Schult. Syst. Veg., 6. p. 300.; Willd. Baumz., p. 518.; Schult. Oestr. Fl., ed. 2., 1. p. 466.; Rœm. et Schult. Syst. Veg., 6. p. 300.; Spreng. Syst. Veg., 1. p. 930.

Spec. Char., &c. Bark grey brown; smooth, not chinky. Leaves with downy petioles; and disks oblong, acuminate, 2¼ in. long, unequal at the base, doubly and very argutely serrate; above, deep green; beneath, downy, and becoming obviously whitish. (*Willd.* and *Schult. Syst. Veg.*, vi. p. 300.) A native of Hungary; said to have been introduced in 1834, but we are not aware that the plant is in British gardens.

♆ 9. *U.* americа́na *L.* The American Elm.

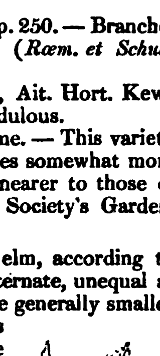
Identification. Lin. Sp. Pl., 327.; Willd. Sp. Pl., 1. p. 1325., exclusive of the var. γ; Willd. Enum. Hort. Berol., p. 295., and Suppl., p. 14.; Poiret. Encycl. Méth., 4. p. 611.; Michx. Fl. Bor. Amer., 2. p. 172.; Rœm. et Schult. Syst., 6. p. 300.; Pursh Fl. Amer. Sept., 1. p. 199., exclusive of the var. β; Michx. Arb., 3. p. 269.; North Amer. Sylva, 3. p. 83. t. 126.; Ait. Hort. Kew., No. 3., exclusive of the var. pendula; Smith in Rees's Cyclop., No. 7.; Lodd. Cat., ed. 1836.
Synonymes. The white Elm, *Amer.*; the Canadian Elm; the American white Elm.
Engravings. Michx. North Amer. Sylva, 3. t. 126.; and our *fig.* 1246.

Spec. Char., &c. Leaf with the petiole 1—1½ in. long, and hairy with short hairs; and the disk unequal at the base, 4—5 in. long, inclusive of a long acuminate point, 2—2½ in. broad, serrate, and mostly doubly so; the axils of the veins underneath joined by a membrane. Flowers peduncled, effuse; peduncles short, glabrous. Stamens 5 and 8. Samara fringed at the edge with hairs, ovate, acute. (*Willd. Enum.* and *Suppl., Rœm. et Schult. Syst. Veg.*) This species is readily distinguishable from others by the membrane which appears at the axils of the veins. (*Willd. Enum. Suppl.*) Young branches brown, with short, very fine hairs. Leaves deeply green above, almost glossy, rough; beneath, pale, downy. Flowers like those of *U.* effùsa. Wild in North America, in low woods, from New England to Carolina. A tree, growing, in North America, to the height of 80 ft. or 100 ft. Introduced in 1752; but rarely flowering, and never ripening seeds, in England.

Varieties.

- ♆ U. *a.* 1 *rùbra* Ait. Hort. Kew., i. p. 319. — Branches red. Leaves ovate, rugose, rough. (*Rœm. et Schult. Syst. Veg.*)
- ♆ U. *a.* 2 *álba* Ait. Hort. Kew., i. p. 319.; Marsh., p. 250. — Branches whitish. Leaves oblong, rough. ? *U.* mollifòlia. (*Rœm. et Schult. Syst. Veg.*)
- ♆ U. *a.* 3 *péndula* Pursh Fl. Amer. Sept., i. p. 200., Ait. Hort. Kew., 1. p. 319., Lodd. Cat., ed. 1836. — Branches pendulous.
- ♆ U. *a.* 4 *incìsa* H. S. See the plate in our last Volume. — This variety differs from the other varieties, in having the leaves somewhat more deeply serrated, and rather smaller, approaching nearer to those of *U.* effùsa. There is a tree in the Horticultural Society's Garden, which, in 1834, was 27 ft. high.

Description, &c. The leaves of the white American elm, according to Michaux, are 4 in. or 5 in. long, borne on short petioles, alternate, unequal at the base, oval-acuminate, and doubly denticulated: they are generally smaller than those of the red elm (*U'lmus* (a.) fùlva). The flowers appear before the leaves, and are very small; of a purple colour, supported by short slender footstalks, and united in bunches at the extremity of the branches. The seeds are contained in flat, oval, fringed capsules, notched at the base. The trunk is covered with a tender white bark, very deeply furrowed. In favourable situations, on the banks of rivers, the tree reaches a great height, and displays extraordinary magnificence of vegetation. "In clearing the primitive forests," says Michaux, "a few specimens of the white elm are sometimes left standing. Insulated in this manner, it appears in all its majesty, towering to the height of 80 ft. or 100 ft., with a trunk 4 ft. or 5 ft. in diameter; regularly shaped, naked, and insensibly diminishing to the height of 60 ft. or 70 ft.; when it divides itself into two or three primary limbs. The limbs, not widely divergent near the base, approach and cross each other 8 ft. or 10 ft. higher; and diffuse on all sides long, flexible, pendulous branches, bending into regular arches, and floating lightly in the air. A singularity is observed in this tree, which I have witnessed in no other: two small limbs, 4 ft. or 5 ft. long, grow in a reversed position near the first ramification, and descend along the trunk." (*N. Amer. Syl.*, iii. p. 85.) In New Hampshire, he adds, "a great number of young white elms are seen detached in the middle of the pastures: they



1246

ramify at the height of 8 ft., 10 ft., or 12 ft.; and their limbs, springing at the same point, cross each other, and rise with a uniform inclination, so as to form on the summit a sheaf-like head, of regular proportions and admirable beauty." (*Ibid.*) The white elm is a native of North America, from Nova Scotia to Georgia, a distance of 1200 miles; but it is found in the greatest perfection in Lower Canada, New Brunswick, Nova Scotia, the north-eastern section of the United States, and Genessee in the state of New York. The white elm delights in low humid situations; soils such as, in the northern states, are called interval lands. In the middle states, it grows in similar situations, and on the border of swamps. West of the mountains, it abounds in all the fertile bottoms watered by the great rivers that swell the Ohio and the Mississippi, particularly on the brink of the rivers, where its base is inundated at the rising of the waters in the spring. The wood is used for the same purposes as the European elm, but it is decidedly inferior in strength and hardness; it has also less compactness, and splits more readily. The bark is said to be easily detached during eight months of the year. Soaked in water, and rendered supple by pounding, it is separated into shreds, or ribands, which are used, in the northern states, for weaving into seats for common chairs, as rushes are in England. (*Michaux.*) This tree was introduced into England in 1752, by Mr. James Gordon; though, as Martyn observes, no notice is taken of it, or of any other American elm, in the edition of Miller's *Dictionary* which was published sixteen years afterwards. The three varieties have doubtless existed in the arboretum at Kew, and, probably, in the grounds at Syon; but they are not now to be found in either of these collections. The only plants which we have seen are those in the Horticultural Society's Garden; where there are several from 15 ft. to 30 ft. in height. They bear a general resemblance to *U.* montàna, both in their naked and clothed state; but they are readily distinguished from that species by the roughness of their bark. The leaves, also, are more pointed, longer in proportion to their breadth, have longer footstalks, and are of a finer green. They so closely resemble other trees, marked, in the Horticultural Society's Garden, *U.* hispánica, as scarcely, if at all, to be distinguishable from them. Michaux sent seeds of this elm to France in 1807, from which several thousand plants were raised; and of which, according to the *Nouveau Du Hamel*, there are very fine specimens at Trianon, where they are distinguished from all other elms by the superior beauty of their leaves. Cobbett informs us that he imported a quantity of elm seed from the borders of Lake Ontario, which was gathered from a tree that had a clear straight stem 70 ft. high, before it began to ramify; but that these seeds, from having been put together before they were thoroughly dried, had fermented on the passage, and not one ever came up. (*Woodlands*, &c., p. 241. and 242.) In the Edinburgh Botanic Garden, there is a tree which, in 1828, was 25 ft. 6 in. high, with a trunk 7 in. in diameter. Price of plants, in the London nurseries, 1*s.* each; and the weeping variety is 50 cents.

♈ 10. *U.* (A.) FU'LVA *Michx.* The tawny-*budded, or slippery,* Elm.

Identification. Michx. Fl. Bor. Amer., 1. p. 172.; Pursh Fl. Amer. Sept., 1. p. 200.; Spreng. Syst. Veg., 1. p. 931.; Rees's Cyclop., No. 10.; Lodd. Cat., ed. 1836.
Synonymes. *U.* rùbra *Michx. Arb.*, 3. p. 278., and a fig., *North Amer. Sylva*, 3. p. 89. t. 128.; Orme gras, *French of Canada and Upper Louisiana*; red Elm, red-wooded Elm, Moose Elm.
Engravings. Michx. North Amer. Sylva, 3. t. 128.; and our *fig.* 1247.

Spec. Char., &c. Resembles the Dutch elm. Branches rough, whitish. Leaves ovate-oblong, acuminate, nearly equal at the base, more or less cordate there; serrate with unequal teeth, rugose, very rough, hairy on both surfaces: they are larger, thicker, and rougher than those of *U.* americàna. Leaf buds tomentose, with a tawny dense tomentum: they are larger and rounder than those of *U.* americàna. Scales of the buds that include the flowers downy. Peduncles of flowers short. Samara not fringed, very like that of *U.* campéstris; orbicular, or, according to the figure in Michaux's *North American Sylva*, obovate. (*Michx.*, *Pursh.*) Leaves variable in shape and serratures, but more downy than the other North Ame-

rican elms. Stamens 5—7. Stigmas purplish. Samara, when young, downy on both sides. This tree has been introduced, but when is not stated in British catalogues.

Description, &c. The red, or slippery, elm, according to Michaux, bears a strong resemblance to the Dutch elm. It forms a tree from 50 ft. to 60 ft. high, and 15 in. or 20 in. in diameter. In the winter, Michaux observes, "it is distinguished from the white American elm by its buds, which are larger and rounder; and which, a fortnight before their developement, are covered with a russet down." The flowers are produced in tufts at the extremity of the young shoots. The scales which surround the bunches of flowers are downy, like the buds. The calyx is downy and sessile; the stamens short, and of a pale rose colour. The seeds are large, destitute of fringe, round, and very similar to those of the European elm; and they ripen very early. The bark is brown; and the leaves are oval-acuminate, doubly denticulated, and larger, thicker, and rougher than those of *U.* americàna. "Except the maritime districts of the Carolinas and Georgia, this species of elm is found in all parts of the United States and of Canada." (*Michaux.*) "It is less abundant than the white American elm; and the two species are rarely found together, as the red elm requires a substantial soil, free from moisture, and even delights in elevated and open situations, such as the banks of steep rivers, particularly the Hudson and the Susquehanna. The heart-wood is coarser-grained and less compact than that of *U.* americàna, and is of a dull red tinge; whence the name of red elm. Even in the branches of 1 in. or 2 in. in diameter, it consists principally of perfect wood. It is the best wood in the United States for blocks; and it makes excellent rails, which are of long duration, and formed with little labour, as the trunk may be easily and regularly split; and this is probably the reason that it is never employed for the naves of wheels. The leaves, and bark of the branches, macerated in water, yield a thick and abundant mucilage (whence the name of slippery elm), which is used as a refreshing drink for colds, and for emollient plasters, in the place of the marsh mallow root, which does not grow in the United States. (*Michx.*) There are small plants bearing the name of *U.* fúlva, in Loddiges's arboretum; but they are scarcely, if at all, distinguishable from *U.* americàna.

1247



♀ 11. *U.* ALA'TA *Michx.* The *Wahoo, or cork*-winged, Elm.

Identification. Michx. Fl. Bor. Amer., 1. p. 173.; Arb., 3. p. 275.; Michx. North Amer. Sylva, 3. p. 87. t. 127.; Pursh Fl. Amer. Sept., 1. p. 200.; Spreng. Syst. Veg., 1. p. 931.; Rees's Cycl., No. 11.
Synonymes. *U.* pùmila *Walt. Fl. Carol.*, 111.; Wahoo, *Indians of North America.*
Engravings. Michx. North Amer. Sylva, 3. t. 127.; and our *fig.* 1248.

Spec. Char., &c. A middle-sized tree, with leaves like those of the hornbeam (*C*árpinus *B*étulus *L.*). Branches bearing two longitudinal corky wings. Leaves with short petioles, and disks that are oblong-oval, narrowed to an acute point, almost equal at the base, toothed. Samara downy, bearing a dense fringe of hairs at the edge: it is smaller than that of *U.* americàna, by the figure in Michaux's *North American Sylva,* narrowed to both ends, and having an open niche at the upper one. (*Michx. N. A. S., Pursh Fl. A. S.*) A tree, 30 ft. high. Introduced in 1820.

Description, &c. The wahoo elm is a tree seldom exceeding 30 ft. in height, with a diameter of 9 in. or 10 in. The flowers do not differ materially from those of the other elms. The seeds are fringed, and much smaller than those of the white American elm. The leaves are oval, doubly denticulated, and rather small. The most remarkable part of the tree is, however, a fungous appendage, two or three lines wide, attached to the branches throughout their whole length; from which the name of alàta (winged) has been given to the species. The

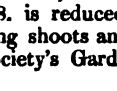

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waboo elm is found only in the lower part of Virginia, in the maritime districts of the Carolinas and Georgia, in West Tennessee, and in some parts of Kentucky. It is generally found on the banks of rivers, and in the great swamps enclosed in the pine barrens. The wood is fine-grained, more compact, heavier, and stronger than that of *U.* americàna. The heart-wood is of a dull chocolate colour, and always bears a great proportion to the sap-wood. At Charleston, and some other parts of the southern states, it is used for the naves of coach wheels; but Michaux says that it is not appropriated to any other use. There are small plants in Messrs. Loddiges's collection, which, from the leaves, might be taken for those of *U.* (c.) suberòsa; and the engraving in Michaux, from which *fig.* 1248. is reduced to our usual scale, closely resembles the young shoots and leaves of that tree of *U.* (c.) suberòsa in the Horticultural Society's Garden, of which a plate is given in our last Volume.

App. i. *Doubtful Sorts of* U'lmus.

This genus, as observed by Professor Lindley (*Synops.*, p. 227.), is in such a state of confusion, that it is impossible to determine what plants are meant by various names extant in botanical works. U. *pubéscens* Walt. and U. *fruticòsa* Willd. are of this description. In p. 174., U. *integrifòlia* and U. *virgàta* are mentioned as Himalayan species, probably hardy or half-hardy. In Royle's *Illust.*, p. 339., U. *lancifòlia*, U. *eròsa*, which resembles *U.* effùsa, U. *lævigàta*, and U. *virgàta*, are mentioned as natives of the Himalayas and other parts of India, and some of them of China. A plant named *U.* canadénsis, in the Horticultural Society's Garden, has a smooth bark, like *U.* montàna, and appears to be nothing more than that species. The Wormley Grange, or Byford, elm, and the black elm of Ireland, are said by Dr. Lindley to be probably other species to add to the British flora. Sir J. E. Smith considers the Hertfordshire elm as *U.* montàna; but Dr. Lindley says that it "is probably a variety of *U.* campéstris." Notwithstanding the utmost attention that we have been able to give to this subject, and the communication of specimens from all parts of the country, we have by no means been able to draw up this article in a manner perfectly satisfactory to ourselves. Specimens, except in cases where they have been gathered from trees by ourselves, and, therefore, serve to remind us of the general appearance and habit of the tree whence they have been taken, we have found in this, as in many other cases, to be of comparatively little use. The genus, as Dr. Lindley has observed, must be studied during a period of several years, from living plants. An ulmarium, though it would not exhibit so much grandeur as a pinetum, so much beauty as an ericetum, nor so much blossom in early spring as a salictum, would be incomparably more useful; provided proper space were allowed to admit of every tree attaining its natural size and shape, and that, after ten or twelve years, a specimen of every tree were cut down, and the wood examined.

Genus II.



PLA'NERA Gmel. THE PLANERA. *Lin. Syst.* Polygàmia Monœ'cia; or Tetr-Pent-ándria Digýnia.

Identification. Gmel. Syst. Nat., 2. p. 150.; Michx. North Amer. Sylva, 3. p. 100.; N. Du Ham., 7. p. 65.; Wats. Dend. Brit., t. 106.; Lindley Nat. Syst. of Bot., p. 179.
Synonymes. Rhámnus *Pall.*, *Güldenst.*; U'lmus, various authors, as to the Plánera Richárdi.
Derivation. Named in honour of *Planer*, professor of botany at Erfurth, who published, in 1788, a work entitled *Index Plantarum Agri Erfordiensis*, in one volume 8vo.

Description. Deciduous trees and shrubs, natives of Western Asia, and North America; quite hardy in British gardens, and readily propagated by grafting on the elm, or by layers, in any common soil.

♀ 1. P. RICHA'RDI Michx. Richard's Planera, *or Zelkoua Tree.*

Identification. Michx. Fl. Bor. Amer., 2. p. 248.; Bieb. Fl. Taur. Cauc. Suppl., 1. p. 187.; Rœm. et Schult. Syst. Veg., 6. p. 304.; Desf. Hist. des Arbres et Arbriss., 2. p. 446.
Synonymes. P. crenàta *Michx. Mém. sur le Zelkoua*; P. carpinifòlia *Wats. Dend. Brit.*, t. 106.; P. crenàta *Desf.*; Rhámnus carpinifòlius *Pall. Fl. Ross.*; *R.* ulmöides *Güldenst. It.*, 1. p. 313. and 427.; *U'lmus* crenàta *Hort. Par.*, *U.* parvifòlia *Willd. Baum.*; *U.* campéstris *Walt. Fl. Carol.*, p. iii.; *U.* polýgama *Richard Act. Paris*, 1781; *U.* nemoràlis *Ait. Hort. Kew.*, ed. 2., p. 108.; *U.* foliis crenatis basi æqualibus, fructu ovoideo, non compresso, *Poiret Encyc. Méth.*, iv. p. 611.; le Zelkoua, or Orme de Sibérie, *Fr.*; Richard's Planere, *Ger.*
Engravings. Pall. Fl. Ross., 1. t. 60.; Wats. Dend. Brit., t. 106.; our *fig.* 1249.; and the plates of the tree in our last Volume.

Spec. Char., &c. Flowers solitary in the axils of leaves; and both flowers and

leaves borne on a shoot that is developed in the same year with themselves. Petiole of leaf not obvious; disk of leaf elliptical, unequal at the base, dentate. Indigenous to the west of Asia, and upon the shores of the Caspian Sea; and to Imiretta and Georgia, on the south of Mount Caucasus. (*N. Du Ham.*) Introduced in 1760; flowering in April or May; and growing to the height of from 50 ft. to 70 ft.

Description, &c. The zelkoua, in its native country, according to Michaux, is a tree of the largest size, growing to the height of from 75 ft. to 80 ft., with a trunk of the diameter of about 4 ft. The trunk is straight and upright, often attaining the height of 25 ft. or 30 ft. before it throws out a single branch. The base of the trunk is not enlarged, like that of most other trees, its thickness being very little greater at the surface of the ground than it is at the point of ramification. Like that of the hornbeam, it is marked with longitudinal furrows, like open gutters. The head is large, tufted, and very much branched; but the branches, though widely extended, are more slender, and more vertical in their direction, than is generally the case with forest trees. The bark of the trunk is not grey and cracked, like that of the elm or the oak, but resembles rather that of the hornbeam or beech. As is the case with those trees, the surface of the bark of the zelkoua is smooth, and its texture is firm and compact; but it has this remarkable difference, that, when the tree becomes about 8 in. in diameter, it scales off in large thin pieces. The flowers are small, of a greenish brown, and smell like those of the elder; and they are disposed in groups along the shoots of the current year. The fruit is not larger than a pea; and the seeds, which are contained in little gibbous capsules, having two cells, are about the size of a grain of hemp-seed. In Imiretta (a pastoral district lying between Georgia and the shores of the Black Sea), where the zelkoua is found in the greatest abundance, the seeds ripen in the month of October; but in France they always drop off before they have completed their maturity. This is the more remarkable, from the tree having been introduced into France above seventy years ago, and there being at Versailles a tree above fifty years old, in a most vigorous state of growth, which has resisted the most severe frosts. The foliage strongly resembles that of the elm in its general appearance. The leaves are borne on very short petioles, and are generally from 1 in. to 3 in. long. They are alternate, and equally dentated, or rather crenulated; differing, in this respect, from those of every kind of elm known; the leaves of the elm always having every large indentation accompanied by a smaller one. The leaves of the zelkoua are, also, of a much firmer and drier texture than those of the elm; and, it is said, are not, like those of the latter tree, liable to the attacks of insects. When the first tree of this species planted in France was cut down, in 1820, it was found to be 70 ft. in height, and its trunk to be 7 ft. in circumference at 5 ft. from the ground. The bole of the trunk was 20 ft. in length, and of nearly uniform thickness; and the proportion of heart-wood to the sap-wood was about three quarters of its diameter. This tree was about fifty years old, but was still in a growing state, and in vigorous health. (See Michaux's *Mémoire sur le Zelkoua*, Paris, 1831.) Descemet, in his *Tableau Historique des Progrès de la Culture des Arbres à Odessa*, &c., describes this species as a "lofty and beautiful tree, a native of Mingrelia and Caucasus, which is distinguished by its shining green, broadly crenulated leaves, and its smooth and greenish trunk." (p. 60.) In British gardens, the rate of growth of this tree is similar to that of the beech or common hornbeam; it attaining the height of 20 ft. in 10 years.



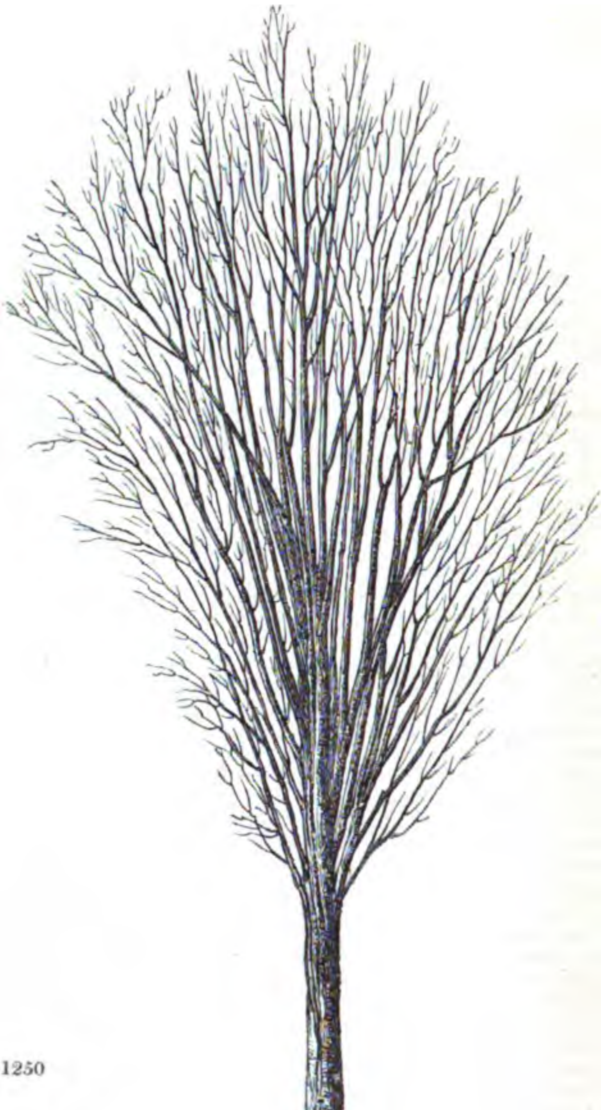
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Geography, History, &c. The zelkoua is a native of the country lying between the Black and the Caspian Seas, between lat. 35° and 47°, particularly of Imiretta and Mingrelia; of the north of Persia, and of Georgia. It was first described by Pallas, in his *Flora Rossica* (published in 1784), under the name of *Rhámnus carpinifòlius.* In 1782, the elder Michaux undertook "a journey into Persia, under the auspices of Monsieur (afterwards Louis XVIII.), in order to make botanical researches. Having left Ispahan, in order to explore the province of Ghilan, he found this tree in the forests which he traversed before arriving at Recht, a town situated on the Caspian Sea. In this town he had opportunities of remarking the use made of the wood, and of judging how highly it was appreciated by the inhabitants." (*Michx. sur le Zelkoua*, p. 3.) The first tree introduced into Europe appears to have been planted by M. Lemonnier, professor of botany in the Jardin des Plantes, &c., (see p. 140.) in his garden at Montreuil, near Versailles. This garden was destroyed in 1820; and the dimensions of the tree, when it was cut down, will be found in p. 1410. The oldest tree now existing in France is in the Jardin des Plantes, where, in 1831, it was about 60 ft. high. It was planted in 1786 (when a sucker of four years old), about the same time as the lime trees which form the grand avenue called the *Allée de Buffon.* There is, however, a much larger zelkoua on an estate of M. le Comte de Dijon, an enthusiastic planter of exotic trees, at Podenas, near Nérac, in the department of the Lot et Garonne. This fine tree was planted in 1789; and, on the 20th of January, 1831, it measured nearly 80 ft. high, and the trunk was nearly 3 ft. in diameter at 3 ft. from the ground. A drawing of this tree, made by the count in the autumn of that year, has been kindly lent to us by M. Michaux; from which *fig.* 1250. is an engraving, to a scale of 1 in. to 12 ft. There are several other trees of the zelkoua, at Podenas, nearly as large; and some elms planted thirty years before the zelkouas, and measured at the same time, were only a few inches more in size. In England, the zelkoua appears to have been planted at Kew, and at Syon, probably about the year 1760, when it was first introduced. A tree in the former garden is upwards of 50 ft. high; and, in the latter, the tree of this species figured in our last Volume was, in 1835, when the drawing was made, upwards of 54 ft. high.

Properties and Uses. Both the sap-wood and the heart-wood of the zelkoua are used as timber. The sap-wood is white, and very elastic, resembling, in many respects, the wood of the ash. The heart-wood, which comprises at least two thirds of the whole, is reddish, and sometimes of a russet brown. This wood, when cut obliquely, resembles that of the robinia, and presents, like it, numerous interlacements of fibres. It is very heavy, and, when dry, becomes so extremely hard, that it is difficult to drive nails into it with a hammer. In the countries where it is abundant, it is employed for the same purposes as oak; and it is found to be even superior to that wood for furniture. Its colour is agreeable; it is finely veined; and its texture is so compact, and its grain so fine, as to render it susceptible of the highest polish. It has, also, the great advantage of never becoming wormeaten, however old it may be. It is remarkably durable as posts, to stand either in water or in the earth. (*Michx. Mém. sur le Zelkoua*, p. 9. 17.)

Propagation and Culture, &c. The zelkoua is generally propagated by grafting on the common elm; but we are told by M. Michaux that M. le Chevalier Gauba, the French consul at Teflis, who is the proprietor of large forests in Imiretta, has had a great quantity of seeds collected, and sent to France, from which young plants have been raised. When grafted, M. Michaux observes that the operation should be performed as near the collar of the stock as possible; when, if the stocks are in a deep fresh soil, the grafts will push shoots of from 6 ft. to 9 ft. long the first season.

Statistics. In the environs of London, the largest tree is at Syon, where, in 1834, it was 54 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 34 ft.; at Kew, it is upwards of 50 ft. high; in the Horticultural Society's Garden, 10 years planted, it is 20 ft. high. (See the plate of this tree in our last Volume.) In Rutlandshire, at Belvoir Castle, 4 years planted, it is 10 ft. high. In France, in the Jardin des Plantes, 55 years planted, it is 58 ft. high, the diameter of the trunk 21 in., and of the head 30 ft.; at Scéaux, 30 years planted, it is 50 ft. high; in the Botanic Garden at Rouen, it is,



1250

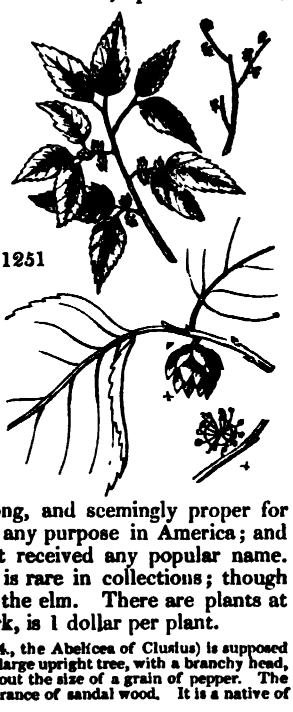
40 ft. high; at Podenas (see *fig.* 1250.), various trees, 50 years planted, are from 70 ft. to 80 ft. high. In Bavaria, in the English Garden at Munich, 16 years planted, it is 12 ft. high. In Italy, at Monza, near Milan, 18 years planted, it is 18 ft. high.

Commercial Statistics. In English nurseries, the plants, being little known, are sold for 2*s.* 6*d.* each, and upwards; but, if in demand, the price would not be higher than that of grafted elms, or about 1*s.* each. At Bollwyller, plants are 1 franc 50 cents each.

⚘ 2. P. GME'LINI Michx. Gmelin's Planera.

Identification. Michx. Fl. Bor. Amer., 2. p. 248.; Desf. Hist. des Arbres et Arbriss., 2. p. 446.
Synonymes. P. ulmifòlia *Michx. Arb. Amer.*, 3. p. 283. t. 7, *North Amer. Sylva*, 3. p. 100. t. 130., *N. Du Ham. Arb.*, 7. p. 65. t. 21.; P. aquática *Willd. Sp. Pl.*, 4. p. 967., *Pursh Fl. Amer. Sept.*, 1. p. 115.; Anonymus aquaticus arbor, &c., *Walt. Carol.*, 230.
Engravings. Michx. Arb. Amer., t. 7.; North Amer. Sylva, 3. t. 130.; Du Ham. Arb., ed. nov., 7. t. 21.; and our *fig.* 1251.

Spec. Char., &c. Flowers in heads, opening before the leaves are protruded, and borne on branches or branchlets developed in some previous year. Leaf with an obvious petiole, and a disk ovate-acuminate, equal at the base, and serrate. A shrub, or low tree, even in its native country, rarely more than 20 ft. or 30 ft. high, and with the diameter of the trunk from 12 in. to 15 in. The flowers appear before the leaves, at the ends of the branches, in globose heads, and upon very short footstalks: they are small, of a greenish brown colour, and not at all conspicuous. The fruit becomes brown before the leaves fall: it is small, oval, inflated, and rough: the seed is minute. The leaf is much smaller than that of P. Richárdi, and resembles that of *U'*lmus campéstris, except in being serrated with equal teeth; it is of a lively green on the upper surface, and grey on the under one. This species is a native of North America, where it is found in Kentucky, Tennessee, the banks of the Mississippi, and throughout the southern states. It is particularly abundant in the large swamps on the borders of the river Savannah in Georgia. The wood of this tree, according to Michaux, "is hard, strong, and seemingly proper for various uses." It is, however, not used for any purpose in America; and the tree is so little esteemed, that it has not received any popular name. It was introduced into Britain in 1816, but is rare in collections; though it might be readily multiplied by grafting on the elm. There are plants at Messrs. Loddiges's. The price, in New York, is 1 dollar per plant.



1251

? *P.* Abelícea *Schultes* (*Rœm. et Schult. Syst. Veg.*, 6. p. 304., the Abelícea of Clusius) is supposed to belong to this genus. It is described by Clusius as being a large upright tree, with a branchy head, roundish deeply serrated leaves, and greenish black fruit, about the size of a grain of pepper. The wood is hard, reddish, and possesses somewhat of the fragrance of sandal wood. It is a native of Crete, on the mountains; but has not yet been introduced.

GENUS III.



CE'LTIS *Tourn.* THE CELTIS, *or* NETTLE TREE. *Lin. Syst.* Polygàmia Monœ'cia, or Pentándria Digýnia.

Identification. Tourn. quoted by T. Nees ab Esenbeck, in his Gen. Pl. Fl. Germ., fasc. 3. t. 4.
Synonymes. Lòtus of Lobel and other authors; Micocoulier, *Fr.*; Züngelbaum, *Ger.*
Derivation. The name of *Cé*ltis is said to refer to the tree having been known to the ancient Celts; and the appellation of Nettle Tree relates to the similarity of the leaves to those of some kind of nettle (*Urtica*).

Description. Handsome, much branched, deciduous trees, natives of Europe and North America, varying in size and foliage, but all bearing fruit,

which is edible, and, though small, is remarkably sweet, and said to be very wholesome. Some of the species, according to Descemet, are very ornamental; particularly *C.* crassifòlia, the branches of which assume the character of a fan; and *C.* occidentàlis, the branches of which droop like a parasol. The wood of *C.* austràlis is valuable; but that of most of the other species is too weak to be of any use in the arts. The leaves of all the species, like those of all the species of *Diospỳros*, drop off almost simultaneously, and thus occasion very little trouble to the gardener in sweeping them up. Propagated by layers or seeds. Plants, in the London nurseries, are 1*s.* 6*d.* each; at Bollwyller, 1 franc; and at New York, 50 cents.

☨ 1. *C.* AUSTRA'LIS *L.* The southern Celtis, *or European Nettle Tree.*

Identification. Lin. Sp. Pl., 1478.; Mill. Dict., No. 1.; Willd. Sp. Pl., 4. p. 993.; Du Ham. Arb., ed. nov., 2. p. 34. t. 8.: Lam. Ill., t. 884. f. 1.; Flore Franç., 3. p. 313.; Duby et Dec. Bot. Gallic., 1. p. 421.; Rœm. et Schult. Syst. Veg., 6. p. 305.; Wats. Dend. Brit., t. 105.

Synonymes. Lòtus árbor *Lob. Ic.*, 2. p. 186.; Lòtus sive Céltis *Cam. Epit.*, 155.; Lote tree; Micocoulier austral, Micocoulier de Provence, Fabrecoulier, Fabreguier des Provençaux (see *N. Du Ham.*); Lotu, *Ital.*

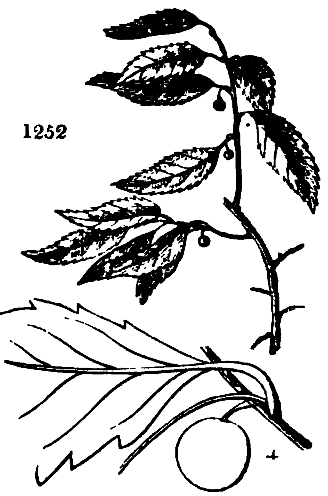
Engravings. Cam. Epit., ic.; Lam. Ill., t. 884. f. 1.; Scop. Del. Flor. Insubr., t. 18; St. Hilaire Livr., 27. t. 7.; Du Ham. Arb., ed. nov., 2. t. 8.; Wats. Dend. Brit., t. 105.; and our *fig.* 1252.

Spec. Char., &c. Leaves ovate-lanceolate, oblong-lanceolate, or acuminate, argutely serrated, unequal at the base, rough on the upper surface; soft, from down, on the under one. Flowers solitary. Fruit black. Indigenous to the south of Europe and the north of Africa (*Willd. Sp. Pl.*, and *Rœm. et Schult. Syst. Veg.*), also to the west of Asia. A tree, growing to the height of 40 ft. Introduced in 1796; flowering in May, and ripening its fruit in October.

Variety. Brotero, in his *Flora Lusitanica*, mentions a variety, with variegated leaves, that was found wild in Portugal.

Description. A tree, from 30 ft. to 40 ft. high, with a straight trunk and branched head. The branches are long, slender, and flexible, with a grey bark, spotted with white, and covered with a slight down at the extremities. The bark of the trunk is dark brown. The leaves are of a dark green, marked str ogly with the nerves on the lower side, and, when young, covered with a yellowish down. They are oval-lanceolate, terminating in a point at the summit, and at the base having one side prolonged down the petiole. The flowers are small, greenish, and inconspicuous; and are produced at the same time as the leaves. The fruit, which, when ripe, is blackish, and resembles a very small withered wild cherry, is said not to become edible till the first frost (see *N. Du Ham.*, vol. ii. p. 35.); and it hangs on till the following spring. It is remarkably sweet, and is supposed to have been the *Lòtus* of the ancients, the food of the Lotophagi; which Herodotus, Dioscorides, and Theophrastus describe as sweet, pleasant, and wholesome; and which Homer says was so delicious, as to make those who ate it forget their country. (See *Odyssey*, lib. ix. v. 93.) The berries are still eaten in Spain; and Dr. Walsh says that the modern Greeks are very fond of them. According to Dr. Sibthorpe, they are called, in modern Greek, honey berries. (See *Hogg on the Classical Plants of Sicily*, in the *Journ. of Bot.*, 2d ser., p. 204.) The tree grows rapidly, more especially when once established, and afterwards cut down; sometimes producing shoots, in the climate of London, 6 ft. or 8 ft. in length. It bears pruning remarkably well, at every age. Its leaves are very

1252



seldom touched by insects, either on the Continent or in England; and the *Cóssus* Lignipérda and Scólytus destrúctor, which are so injurious to the timber of many other trees, never touch either that of *Céltis*, that of Plánera Richárdi, or that of *Pýrus Sórbus*. *C.* austràlis is found on both the shores of the Mediterranean, throughout the whole of the south of France, Italy, and Spain. It is particularly abundant in Provence; and there is a celebrated tree at Aix, under which it is said that the ancient sovereigns of Provence delivered their edicts to the people. The European nettle tree is much used in the north of Italy and the south of France, for planting squares and public walks, where it is frequently found from 40 ft. to 50 ft. high, with trunks from 1½ ft. to 3 ft. in circumference. The wood of this tree is extremely compact; ranking between that of the live oak and that of the box, for hardness and density. According to Baudrillart, it weighs, when dry, 70 lb. 3 oz. per cubic foot. The wood of the branches is elastic, and so extremely supple, that a piece 5 ft. or 6 ft. long, and 1 in. in diameter, may be made into a circle without breaking. Its compactness renders it susceptible of a high polish; and, when it is cut obliquely across the fibres, it very much resembles satin-wood. It is principally used for furniture, and, by the sculptors in wood, for carving into the statues of saints; but it is also employed for making tubs and cisterns, and the branches for hay-forks. These divers uses, says M. De Cubières, "remind one of the verses of La Fontaine, when he makes his carver in wood exclaim, —

> "Sera-t-il dieu, table, ou cuvette?"
>
> "What shall I make of it? ay, that 's the rub;
> A god, a table, or a salt-fish tub?"

The principal use, however, of the nettle tree, in the south of France, is for making hay-forks; for which use the pliability and toughness of its branches render it particularly suitable. Plantations of the tree, for this purpose, are common near Lyons, and in several parts of the south of France; and in the department du Gard there are about seven acres of rocky ground which would be quite useless for any other purpose, but which are planted with nettle trees, from which above 5000 dozens of hay-forks are made every year, producing a yearly revenue of 25,000 francs. The stem of this tree, when cut over by the ground, throws up thick and vigorous shoots, which make excellent handles for coach whips, ramrods to muskets, and walking-sticks, which have almost the flexibility of a supple-jack. When the trees are intended for this purpose, they are planted in masses very close to one another, in order that they may be drawn up, and increase in length rather than in thickness. The inhabitants of Narbonne, and of the department of Aude, cultivate the nettle tree for these purposes, in the very best soil; and the shoots produced form an article of extensive commerce, under the name of *bois de Perpignan*, furnishing, according to Baudrillart, whip-handles to all the coachmen in Europe. It is also much used for musical instruments, and for the shafts and axletrees of carriages, the poles of sedan chairs, and the naves of wheels. The root is used for dyeing yellow; the bark for tanning; and an oil is expressed from the stones of the fruit.

Statistics. In the environs of London, the largest tree is at Mitcham, in the grounds which formerly belonged to Mr. Dubois; where the trunk is 6 ft. 8 in. in circumference, and the head 50 ft. in diameter. It bears abundance of fruit every year, as noticed, with other particulars, in p. 63. At Kew, there is a tree 40 ft. high; and one at Kenwood, which, in 40 years, has attained the height of 40 ft., with a trunk 1 ft. in diameter. In Dorsetshire, at Melbury Park, 30 years planted, it is 28 ft. high; the diameter of the trunk is 2 ft., and of the head 21 ft. At Coul, in Cromarty, it is 16 ft. high. Near Dublin, at Terenure, it is 10 ft. high. In France, in the Jardin des Plantes, in Paris, 60 years planted, it is 60 ft. high, the diameter of the trunk 1½ ft.; in the Botanic Garden at Toulon, 50 years planted, it is 40 ft. high, and the diameter of the trunk 1¼ ft.; near Montpelier, there is a tree with a trunk 3 ft. 4 in. in diameter. In Italy, at Monza, 100 years old, it is 70 ft. high; the diameter of the trunk 3 ft., and of the head 72 ft.

❦ 2. *C.* (A.) CAUCA'SICA *Willd.* The Caucasian Celtis, *or Nettle Tree.*

Identification. Willd. Sp. Pl., 4. p. 994.; Poiret in Encycl. Suppl., 3. p. 688.; Rœm. et Schult. Syst. Veg., 6. p. 305.

Spec. Char., &c. This is very closely akin to *C.* austràlis; but it differs in its leaves being more ovate, having the acuminate part shorter, and being glabrous, except in so far as is stated below. The leaves of *C.* caucásica may be described as follows: — Oblong, acuminate, serrate with large teeth, a

little narrowed at the base, and almost equal there; above, deep green; beneath, pale, yellowish; and the veins, when seen under a lens, a little hairy. Indigenous to Caucasus, on the statement of Adams. (*Willd. Sp. Pl.*) Willdenow had seen a dried specimen with fruit. In *Rœm. et Schult. Syst.*, it is quoted from *Poiret Encycl. Suppl.*, that the teeth of the leaves are usually large, and are unequal; and that the fruit is solitary, axillary, globose, and reddish, and borne upon a peduncle of the length of the petiole. It is noted that it is very remarkable that the author of the *Flora Taurico-Caucasica* (Bieberstein) has not mentioned this species in that work. (See under *C.* sinénsis *Pers.*, No. 4.)

♆ ♠ 3. *C.* TOURNEFO'RTII Lam. Tournefort's Celtis, *or Nettle Tree.*

Identification. Lam. Encycl., 4. p. 132.; Willd. Sp. Pl., 4. p. 994.; Bieb. Fl. Taur. Cauc., 2. p. 449. Rœm. et Schult. Syst. Veg., 6. p. 306.; N. Du Ham. Arb., 2. p. 38.
Synonymes. *C.* orientalis minor, foliis minoribus et crassioribus, fructu flavo, *Tourn. Cor.*, 42., *Itin.*, 2. p. 425. t. 41.; *C.* orientàlis *Mill. Dict.*, No. 3., but, according to the *Nouveau Du Hamel*, not of Lin., which is considered a half-hardy plant in Britain; Micocoulier du Levant, Micocoulier d'Orient, *Fr.*; Morgenlandischer Züngelbaum, *Ger.*
Engravings. Tourn. Itin., t. 41.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves, when adult, ovate, acute, unequal at the base, crenately serrate, roughish on the upper surface; when young, subcordate at the base. Fruit yellow, becoming brown. (*Willd. Sp. Pl.*, and *Rœm. et Schult. Syst. Veg.*) A native of Armenia. (*Tournefort.*) Leaves bluntish, rough on both surfaces, glossy. (*Spreng. Syst. Veg.*) Introduced in 1739, and flowering and fruiting at the same time as *C.* austràlis.

Description, &c. A shrub, or low tree, rarely exceeding 25 ft. in height, but generally forming a bush of only 10 ft. or 12 ft. high, with round glabrous branches, covered with a brownish bark. The petiole of the leaf is very short; the disk is unequally dentated, somewhat heart-shaped, and glabrous; it is of a deep green above, and paler beneath, and is of a thicker texture than that of Céltis austràlis. The fruit, which is solitary, and borne on a long peduncle, is oval, greenish at first, then becoming yellowish, and afterwards nearly black. From the specimens in the London Horticultural Society's Garden, the fruit does not appear to ripen so soon as that of *C.* occidentàlis; as, in October, 1836, the fruit of *C.* Tournefórtii was quite firm and green, while that of *C.* occidentàlis was shriveled, blackish, and extremely sweet. *C.* Tournefórtii is a native of the Levant; from which country Tournefort brought the seeds to the Jardin des Plantes, in Paris, about 1717, whence plants have been distributed all over Europe. It was introduced into England in 1739. It is rather more tender than *C.* austràlis and *C.* occidentàlis. The seeds should be sown in autumn, as soon as they are ripe; as, if not sown till spring, they generally remain a year or more in the ground. They prefer a moist soil, and a sheltered situation. This species is readily known from all others, in winter, by its forming a compact upright-branched bush, or low tree; and, in summer, by the deep green and dense mass of its rigid-looking foliage. There are plants of it from 6 ft. to 8 ft. high, in the London Horticultural Society's Garden, and at Messrs. Loddiges's.

♆ ♠ 4. *C.* (T.) SINE'NSIS *Pers.* The China Celtis, *or Nettle Tree.*

Identification. Pers. Syn., 1. p. 292.; Rœm. et Schult. Syst. Veg., 6. p. 306.

Spec. Char., &c. Leaves broad-ovate, obtuse, crenate, largish, glabrous; veins prominent. Native in China. Cultivated in Cels's garden. (*Pers. Syn.*) A low tree, growing to the height of from 12 ft. to 15 ft. The plant of this kind in the Horticultural Society's Garden seems to differ very little, if at all, from *C.* Tournefórtii.

♆ 5. *C.* WILLDENOVIA'NA Schultes. Willdenow's Celtis, *or Nettle Tree.*

Identification. Rœm. et Schult. Syst. Veg., 6. p. 306.
Synonyme. *C.* sinénsis *Willd. Enum. Suppl.*, p. 68., *Willd. Baumz.*, p. 81.
Spec. Char., &c. Leaves ovate oblong, acuminate, narrowed to the base, serrate from the middle to the tip; above, glabrous; beneath, roughish. Schultes has quoted *Willd. Baumz.*, p. 81., for this specific character; and has added, that a young tree in the Berlin Royal Garden has the disk of its leaf 1½ in. long, and the upper surface, as inspected through a lens, dotted; and that the kind is a native of China. In a supplement (published in 1813) to Willdenow's *Enumeration of the Plants of the Berlin Royal Garden*, is the following short description of *C.* sinénsis *Willd.*, which, though not essentially different from the above, is not quite the same:—Leaves obovate oblong, serrated at the tip; glossy on the upper surface, slightly hairy on the under one. Schultes has noted that the specific character of *C.* sinénsis *Pers.* clearly shows that kind to be distinct from the *C.* sinénsis *Willd.*; and that, as *C.* sinénsis *Pers.* was first published, it is necessary to apply some

other name to *C.* sinénsis *Willd.* Schultes has given it that of Willdenoviàna. There being no plant bearing the name of *C.* Willdenoviàna in the London gardens, we can say nothing about it.

ᵻ 6. *C.* OCCIDENTA`LIS *L.* The western Celtis, *or North American Nettle Tree.*

Identification. Lin. Sp. Pl., 1478.; Mill. Dict., No. 2., and Ic., t. 88.; Michx. Arb., 3. p. 226. t. 8., North Amer. Sylva, 3. p. 45. t. 114.; Du Roi Harbk., 1. p. 141.; Willd. Arb., 57., Willd. Sp. Pl., 4. p. 994.; Lam. Encycl., 4. p. 137.; Du Ham. Arb., ed. 1., t. 53.; N. Du Ham., 2. p. 36. t. 9.; Pursh Fl. Amer. Sept., 1. p. 200., Rœm. et Schult. Syst. Veg., 6. p. 306.; Wats. Dendr. Brit., t. 147.; Lodd. Cat., ed. 1836.

Synonymes. C. fructu obscuro purpurascente *Tourn. Inst.*, 612.; *C.* obliqua *Mœnch*; Nettle Tree, Sugar Berry, *Amer.*; Bois inconnu, *Illinois*; Micocoulier de Virginie, *Fr.*

Engravings. Mill. Ic., t. 88.; Du Ham. Arb., ed. 1., 1. t. 53., ed. nov., 2. t. 9.; Michx. North Amer. Sylva, 3. t. 114.; Wats. Dendr. Brit., t. 147.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. t. 4.; and the plates of this species in our last Volume.

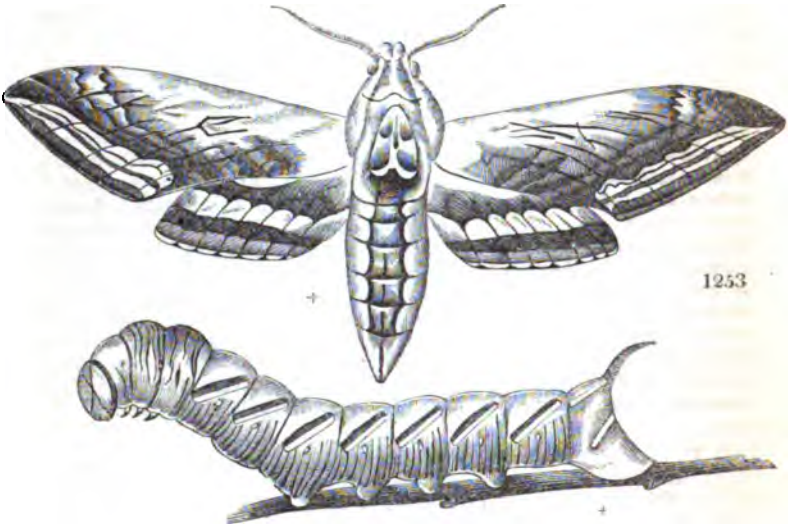
Spec. Char., &c. Leaves ovate-acuminate, unequal at the base, serrate, rough on the upper surface, hairy on the under one. Fruit dull red. (*Michx. N. A. S.*) Fruit dark purple. (*Pursh Fl. A. S.*) Similar in foliage and general appearance to *C.* austràlis. Flowers solitary. (*Michaux.*) Leaves serrate, with equal teeth. Flowers, in the lower part of the branch, 3 in an axil; in the upper part, 1 only in an axil. Fruit obscurely purplish. (*Rœm. et Schult. Syst. Veg.*) Very closely akin to *C.* austràlis. Leaves, when young, ovate-lanceolate, a little downy; when adult, broad-ovate, acuminate; in the acuminate part, and at the base, entire; in the interval on each side, serrate, glabrous, veined with conspicuous veins; the hinder portion of the base as narrow again as the other one. (*Linn.*, quoted in *Rœm. et Schult. S. V.*) *C.* occidentàlis differs from *C.* austràlis, in having its leaves much broader in proportion to their length, and of an oval-acuminate form. (*Lam. Encycl.*, iv. p. 137.) Disk of leaf 3—4 in. long. (*Rœm. et Schult. S. V.*) Indigenous, in woods and near rivers, from Canada to Carolina, where it flowers in May. (*Pursh.*) Introduced in 1656.

Varieties.

- ᵻ C. *o.* 2 *cordàta* Willd. Wild. Baumz., p. 82. — Leaves subcordate at the base, very acuminate; above, less rough; beneath, more veiny. disk 3—4 in. long. (*Willd. W. Baumz.*, and *Rœm. et Schult. Syst. Veg.*)
- ᵻ C. *o.* 3 *scabriúscula* Willd. Sp. Pl., iv. p. 995., Lam. Encycl., iii. p. 137.; *C.* austràlis *Willd. Arb.*, 56.; *C.* ? o. β tenuifòlia *Pers. Syn.*, 1. p. 292.; *C.* áspera *Lodd. Cat.*, ed. 1836; *C.* orientàlis *Hort.*—Leaves shorter, more slender, less acuminate; roughish above, in some instances glabrous; but it can scarcely be a distinct species. (*Willd. Sp. Pl.*) Disk of leaf 1½—2 in. long. (*Rœm. et Schult. S. V.*) It is a native of Louisiana, and was cultivated in the Royal Garden at Paris; but, as it was killed down to the root every winter by the frost, Lamarck never saw its flowers or fruit, and, therefore, could not determine whether it was merely a variety or a distinct species. (*Smith* in *Rees's Cyclo.*)

Description, &c. This species, Michaux observes, "is similar in its foliage and general appearance to the European nettle tree, the branches of both are numerous and slender; and the limbs originate at a small distance from the ground, and take a horizontal or inclined direction." (*N. Amer. Syl.*, iii. p. 45.) The leaves are alternate, oval, oblique at the base, very much acuminated, and somewhat rough. The flowers open early in spring, and are small, white, single, and axillary; the fruit also is small, single, of a round form, and a dull red colour. When ripe, it becomes shriveled, and of a reddish brown or black, like a very small wild cherry. It is rather fleshy, and very sweet. Michaux says that he has never seen the wood employed in any part of the United States; but, from the analogy between this species and the European one, he has no doubt but that the wood might be applied to the same purposes. The tree, in Britain, is very hardy and ornamental; and it possesses the property of keeping on all its leaves very late, and then, like the other species, dropping them all at once, so that they may be swept away at one time for litter. *C.* occidentàlis is readily known from *C.* austràlis

by its leaves being larger, and of a lighter and more shining green, and its wood being of a lighter colour in winter. The leaves also die off sooner, and of a brighter yellow, than those of the European species. It is more hardy, and is readily propagated by layers, or by seeds. The insect most commonly found on the nettle tree and hackberry, in America, is the *Sphínx drupiferàrum*, or Hackberry Hawk Moth. (*Abbott and Smith's Insects of Georgia*, and our *fig.* 1253.) This insect greatly resembles the privet hawk



1253

moth (p.1201.); but the colour of the moth is a beautiful shaded brown, without any tinge of redness. The larva is green, beautifully marked with shaded pink and a brilliant white.

Statistics. Céltis occidentàlis in the Environs of London. At Syon, it is 54 ft. high; diameter of the trunk 2 ft. 4 in., and of the head 30 ft. In the Fulham Nursery, 70 years planted, it is 50 ft. high.

Céltis occidentàlis South of London. In Devonshire, at Killerton, 25 years planted, it is 33 ft. high, diameter of the trunk 9 in., and of the head 31 ft. In Surrey, at Barn Elms, it is 40 ft. high, diameter of the trunk 2 ft., and of the head 54 ft. In Sussex, at Westdean, 14 years planted, it is 19 ft. high.

Céltis occidentàlis North of London. In Cambridgeshire, in the Cambridge Botanic Garden, it is 35 ft. high, diameter of the trunk 1 ft. 7 in., and of the head 24 ft. In Durham, at Southend, 6 years planted, it is 11 ft. high. In Lancashire, in the Manchester Botanic Garden, 5 years planted, it is 4 ft. high. In Oxfordshire, in the Oxford Botanic Garden, it is 30 ft. high, diameter of the trunk 1 ft. 4 in., and of the head 30 ft. In Suffolk, in the Bury Botanic Garden, 10 years planted, it is 12 ft. high; at Ampton Hall, 12 years old, it is 11 ft. high. In Worcestershire, at Croome, 20 years planted, it is 20 ft. high; at Croome (var. scabriúscula), 20 years planted, it is 15 ft. high. In Yorkshire, in the Hull Botanic Garden, 10 years planted, it is 13 ft. high.

Céltis occidentàlis in Scotland. In the Edinburgh Botanic Garden, 14 ft. high. At Dalhousie Castle, 6 years planted, it is 8 ft. high.

Céltis occidentàlis in Ireland. Near Dublin, at Terenure, 8 years planted, it is 6 ft. high.

Céltis occidentàlis in Foreign Countries. In France, at Paris, in the Jardin des Plantes, 130 years old, it is 68 ft. high, diameter of the trunk 1 ft. 8 in., and of the head 40 ft.; at Nantes, in the nursery of M. De Nerrières, 29 years planted, it is 29 ft. high, the diameter of the trunk 2 ft.; in the Botanic Garden at Avranches, 40 years planted, it is 40 ft. high, the diameter of the trunk 1 ft., and of the head 28 ft. In Hanover, in the Botanic Garden at Göttingen, 30 years planted, it is 30 ft. high, the diameter of the trunk 1 ft. In Saxony, at Wörlitz, 30 years planted, it is 40 ft. high. In Austria, at Vienna, in the University Botanic Garden, 60 years planted, it is 55 ft. high, the diameter of the trunk 2 ft., and of the head 29 ft.; at Brück on the Leytha, 45 years planted, it is 60 ft. high, the diameter of the trunk 2¼ ft., and of the head 40 ft. In Bavaria, at Munich, in the Botanic Garden, 24 years planted, it is 15 ft high. In Prussia, at Berlin, in the Botanic Garden, 30 years planted, it is 15 ft. high; in the Pfauen Insel, 40 years planted, it is 26 ft. high, with a trunk 8 in. in diameter.

♀ 7. *C.* CRASSIFO'LIA *Lam.* The thick-leaved Celtis, *or Hackberry.*

Identification. Lam. Encycl., 4. p. 132.; Michx. Arb., 3. p. 228. t. 9.; North Amer. Sylva, 3. p. 47., t. 115.; Willd. Sp. Pl., 4. p. 995.; Pursh Fl. Amer. Sept., 1. p. 200.; N. Du Ham., 2. p. 37.; Rœm. et Schult. Syst. Veg., 6. p. 307.

Synonymes. C. cordifòlia *L'Hérit. Hort. Par.*; C. cordàta *Desfont.*, t. 2. p. 448., *Dum. Cours. Bot. Cult.*, 6. 389., *Lodd. Cat.*, ed. 1836; Hagberry or Hoop-ash, *Amer.*; Micocoulier à Feuilles en Cœur, *Fr.*
Engravings. Michx. North Amer. Sylva, 3. t. 115.; N. Du Ham., 2. t. 9.; and our *fig.* 1254.

Spec. Char., &c. Leaves with disks ovate-acuminate, 6 in. long, 3—4 in. broad; heart-shaped, auricled and unequal at the base; serrated with unequal teeth, rather leathery, rough on both surfaces. Flowers 1—2 upon the peduncle. Fruit black. (*Michx.*, *Lam. Encycl.*, *Willd.*, *Pursh.*) Indigenous to North America, in woods and near rivers in Virginia, Kentucky, and Tennessee; in which places it flowers in May. (*Pursh.*) Allied to *C.* occidentàlis. Young branches downy. Bark red brown. Leaves 5 in. long, and more. Petioles slightly hairy, 3—6 lines long. Flowers much like those of *C.* austràlis, upon slender peduncles; the peduncles of the fruit longer than the petioles. Fruit of the size of the bird cherry. (*Lamarck*, as quoted in *Rœm. et Schult. Syst. Veg.*, vi. p. 307.)

Description, &c. This, according to Michaux, is a very distinct species; and it forms " one of the finest trees which compose the dusky forests of the Ohio." It sometimes grows to the height of more than 80 ft., but with a trunk of the very disproportionate diameter of only 18 in. or 20 in.

1254



" The hackberry is distinguished by the form of its trunk, which is straight, and undivided to a great height; and by its bark, which is greyish, unbroken, and covered with asperities unequally distributed over its surface. Its leaves are larger than those of any other species of nettle tree; being 6 in. long, and 3 in. or 4 in. broad. They are oval-acuminate, denticulated, cordiform at the base, of a thick substantial texture, and of a rough surface. The flowers are small, white, and often united in pairs on a common peduncle. The fruit is round, about as large as a pea, and black at its maturity." (*N. Amer. Syl.*, iii. p. 48.) The hackberry is found in the greatest abundance in the western states of America, and on the banks of rivers and in valleys, wherever the soil is fertile, in Kentucky and Tennessee. The banks of the Delaware above Philadelphia may be considered as its north-eastern boundary; and it has never been found in any of the more southern states. It was introduced into England in 1812. It is principally considered, even in America, as an ornamental tree; and is well adapted for planting in situations where a screen or shade is required, from the rapidity and luxuriance of its growth, and the large size and thick texture of its leaves. The wood is of little value, from its weakness, and its liability to decay when exposed to the weather. It is, however, " fine-grained and compact, though not heavy; and, when freshly exposed, it is quite white. Sawn in a direction parallel or oblique to its concentric circles, it exhibits the fine undulations that are observed in the elm and the locust." (*N. Amer. Syl.*, iii. p. 48.) The sap-wood, Michaux adds, if laid open in spring, will change, in a few minutes, to green, from a pure white. The only uses to which the wood is applied, in America, is for shingles, for the bottoms of chairs, and for baskets; for which it is admirably adapted, from its lightness, facility to split, and elasticity. The plants of this kind of Céltis, in the arboretum of Messrs. Loddiges (where it is named *C.* cordàta), are quite small; and from their appearance we should judge it to be only a variety of *C.* occidentàlis, though, according to Michaux's figure (of which *fig.* 1254. is a reduced copy), the two sorts are very distinct.

Statistics. In Cheshire, at Eaton Hall, a tree, 13 years planted, is 15 ft. high. In Durham, at South End, 6 years planted, it is 11 ft. high. Near Dublin, at Terenure, 10 years planted, it is 8 ft. high. In Austria, at Brück on the Leytha, 12 years planted, it is 9 ft. high. In Lombardy, at Monza, 24 years planted, it is 35 ft. high; diameter of the trunk 7 in., and of the head 20 ft.

■ 8. *C.* LÆVIGA'TA *Willd.* The glabrous-*leaved* Celtis, *or Nettle Tree.*

Identification. Willd. Enum. Suppl., p. 68.; Willd. Baumz., p. 81.; Rœm. et Schult. Syst. Veg., 6. p. 306.

Synonyme. Sprengel has suggested, in the Index to his *Syst. Veg.*, that glabràta is the epithet fitter for this species than lævigàta: *glabràta* signifies rendered, or become, bald; *lævigàta*, rendered perfectly even in surface.

Spec. Char., &c. Leaves ovate-lanceolate, subcordate at the base, nearly entire; glabrous on the upper surface; roughish upon the veins on the under one. (*Willd. Enum. Suppl.*) In Rœm. et Schult. *Syst. Veg.*, a somewhat different specific character is quoted from Willd. *Wild. Baumz.*, p. 81., the following: — Leaves ovate, acuminate, subcordate at the base, unequal there, nearly entire, glabrous on both surfaces. Additionally to the specific character, it is stated as follows: — It is a large tree. Its leaves have 1—2 teeth at the tip. It is a native of Louisiana. To this kind seems to belong that Céltis named *C.* americàna, or Micocoulier de la Louisiane, cultivated in the Paris Garden, which Poiret, in *Encycl. Suppl.*, 3. p. 668., No. 10., has noticed to have its leaves membranous, rough on both surfaces, yet nearly glabrous; with the base with one side shorter than the other, and narrower, and some leaves almost falcate.

■ 9. *C.* PU'MILA *Ph.* The dwarf Celtis, *or Nettle Tree.*

Identification. Pursh Fl. Amer. Sept., 1. p. 200.; Rœm. et Schult. Syst. Veg., 6. p. 307.

Spec. Char., &c. A small straggling bush. Leaves ovate, acuminate, serrate with equal teeth; unequal at the base; downy while young, afterwards nearly glabrous on both surfaces. Flowers 3 upon a peduncle. Fruit solitary, ovate, black. Indigenous to the banks of rivers in Maryland and Virginia, where it flowers in May. Pursh has seen the kind alive. (*Pursh Fl. A. S.*) The plant was introduced by Lyon in 1812; and the name is in Loddiges's *Catalogue*, ed. 1836; but we have not seen the plant there or elsewhere.

App. i. *Species of Céltis half-hardy, or not yet introduced.*

C. orientàlis Lin., R. Mal., 4. t. 40., and our *fig.* 1255., is a native of the Himalayas, introduced in 1820. In foliage it resembles *C.* occidentàlis; but we have only seen a very small plant of it, against a wall, in the Horticultural Society's Garden. In p. 174., five Himalayan species are enumerated as likely to prove hardy or half-hardy; but none of them are yet introduced. In the *Hortus Britannicus* three species are enumerated as indigenous to Jamaica, and as, in Britain, requiring the stove; but, as *C.* orientàlis is also designated as a stove tree in catalogues, it is possible that the Jamaica species may be equally hardy. In the Himalayas, Royle observes, the genus Céltis occurs at considerable elevations, and as far north as Cashmere. *C.* orientàlis *Wall.*, which we suppose to be identical with *C.* orientàlis *Lin.*, "and species allied to it, occur in the hottest places; *C.* tetrándra *Roxb.* extends along the foot of the mountains as far as Cashmere." *C.* alpina *Royle* was found by Mr. Royle on Urrutka, nearly at the greatest elevation, and if it were introduced would, doubtless, be hardy in the climate of London. *C.* Inglèsii Royle occurs in Kunawur; and is, doubtless, equally hardy with *C.* alpina. As the seeds of Céltis go in little bulk, and retain their vital energies for at least a year, there will be little difficulty, we think, in getting these species introduced into Britain.



1255

CHAP. CII.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER JUGLANDA'CEÆ.

THE hardy ligneous plants of this order are included in the genera named and characterised as under: —

JU'GLANS L. Flowers unisexual; those of both sexes upon one plant. — Male. Flowers in cylindrical, drooping, solitary catkins; many in a catkin: the catkins developed from buds borne by shoots produced previously to the year in which the catkins appear. Calyx of 5—6 scales, that are attached to a bractea at a distance from its base and tip. (Is the flower stalked, and connate with the bractea?) Stamens 18—36.—Female. Flowers solitary, or a few in a group, terminal upon a shoot developed in the same year. Calyx ovate, including and adhering to the ovary, except in the 4-toothed tip. Petals 4, small, inserted into the free part of the calyx. Ovary of one cell, and one erect ovule. Stigmas 2—3, fleshy, scaly with

glands. Fruit a drupe (a tryma, *Watson*). Covering of the nut, a fleshy husk of one piece, that bursts irregularly. Nut woody, of 2 valves. Seed 1, erect, lobed, wrinkled, eatable in most, perhaps all.—Species 4, 3 native to North America, 1 to Asia. Large trees. Rate of growth quicker than in Cárya. Leaf bud not covered by scales. Leaves alternate, impari-pinnate, of 5—19 leaflets, all but the terminal one in opposite, or nearly opposite, pairs; all serrate in most, and all spreading in one plane. Some species pubigerous; ? hairs simple, glanded. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ., Lindley Nat. Syst. Bot., Nuttall Gen. N. Amer. Pl., Michaux North Amer. Sylva*, and observation.)

CA'RYA *Nuttall.* Flowers unisexual, those of the two sexes upon one plant; male, female, and leaves, all upon a shoot, developed from one bud in the year of the flowering; male flowers borne at the base of the shoot below the leaves, or in the axils of the lower leaves; the female flowers, a few together about the tip of the shoot.—Male. Flowers in slender pendulous catkins, that are disposed 3 upon a peduncle. Calyx a 3-parted minute leaf. Stamens 4—6.—Female. Calyx including, and adhering to, the ovary: its tip free, and 4-cleft. Stigma sessile upon the ovary, partly discoid, 2—4-lobed. Fruit a drupe (a tryma, *Watson*). Husk fleshy, separating into 4 equal valves, or dividing into 4 equal portions in the upper part. Nut with 4 or more bluntish angles in its transverse outline; the surface pretty even. Seed eatable or bitter.—Species about 10, native to North America. Large trees. Rate of growth slower than in Júglans. Bark appearing reticulated.—Leaf buds partially covered with scales in some species, naked in others. Leaves alternate, impari-pinnate, of 5—15 serrate leaflets; all, except the terminal one, in opposite, or nearly opposite, pairs; and all spreading in one plane. Pubescence stellate. Fruit upon short stiff stalks. Nuttall has stated (*Gen.*) that the sexes are polygamous; but he has not described the bisexual flowers, nor the disposition of them. (*Nuttall Gen., Michaux N. Amer. Sylva, Watson Dend. Brit.*)

PTEROCA'RYA *Kunth.* Flowers unisexual, those of the 2 sexes upon one plant.—Male. Flowers in spikes. Stamens in a flower many.—Female. Flowers in long pendulous spikes, and distant, sessile, and ? without bracteas. Calyx connate with the ovary, except in a terminal portion, which is cleft into ? 3—5 ? unequal lobes. Ovary, and the part of the calyx that is connate with it, taken together, flagon-shaped, bearing 2 wings above the base; their direction transverse and oblique: cell 1; ovule 1, erect. Style 1, very short. Stigmas 2, large, spreading, revolute. Fruit subdrupaceous, angled; having 2 wings, as the ovary; much tapered to the tip, not opening, containing a bony nut, which has 4 cells in its lower part, whose partitions do not extend to the top, so that it is 1-celled there. Seed 1, its lower part in 4 deep lobes. Embryo not accompanied by albumen; its radicle uppermost.—Species 1, indigenous to the eastern part of Caucasus, and in moist woods, by the Caspian Sea. A tree. Leaves impari-pinnate not dotted; leaflets about 17, lanceolate, sessile, unequal at the base, argutely serrulate; the veins beneath villous. Fruit small. (*Kunth* in *Ann. Scien. Nat.*, ii. p. 346.; *Willd. Sp. Pl.*; and *Spreng. Syst. Veg.*).

GENUS I.



JU'GLANS *L.* THE WALNUT TREE. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Schreb. Lin. Gen., No. 1446.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. t. 2.; Nutt. Gen. N. Amer. Pl., 2. p. 220., Lindl. Nat. Syst. of Bot., p. 180.
Synonymes. Noyer, *Fr.*; Walnuss, *Ger.*
Derivation. Júglans is contracted from *Jovis*, Jove's, and *glans*, a mast, or acorn; and was applied by the Roman writers to this tree, on account of the excellence of its fruit as food, compared with

other masts, or acorns; the only species that was known to the Romans having been the *Jùglans règia*, or common walnut tree.

Description. Large trees, with pinnate leaves, coarse-grained wood, and fruit, in one species at least, much esteemed at the dessert, and valuable for the oil which it contains.

General Observations. The trees belonging to this order bear, with only two or three exceptions, so close a resemblance to one another in their young state (in which state alone most of them are to be seen in Britain), that we have been unable to satisfy ourselves as to what are species, and what are only varieties. In pursuance of our idea, that no plant can be truly a species, that is not readily distinguished from every other, in every stage of its growth, and at every season of the year, we should say that there were not more than two species of walnut hitherto discovered, either in Europe or America; viz. *Jùglans règia* and *J. nìgra*: and three species of *Càrya*; viz. *C. amàra*, *C. laciniòsa*, and *C. squamòsa*. We submit this opinion, however, with great deference, having formed it chiefly from inspecting the young plants in the Horticultural Society's Garden, in the collection of Messrs. Loddiges, and from observing the great variety of foliage distinguishable in a bed of seedlings of any of the American sorts; we shall therefore adopt the descriptions and figures of Michaux, and leave the truth to be discovered by time and future observation. Previously to describing the species of the three genera, *Jùglans*, *Càrya*, and Pterocàrya, we shall quote Michaux's introductory observations; premising that this author includes both *Jùglans* and *Càrya* under the genus *Jùglans*; the genus *Càrya*, as we have seen in the generic characters above, having been separated from *Jùglans* by Nuttall, chiefly on account of a technical distinction in the fruit. "The walnuts of North America," Michaux observes, "appear to present characters so distinct, as to require their division into two sections. These characters consist principally in the form of the barren aments, or male catkins; and in the greater or less rapidity of growth in the trees. The first section is composed of walnuts with single aments, and includes two American species: the black walnut (*Jùglans nìgra L.*, fig.1260. in p.1436.), and the butter-nut (*J. cinèrea L.*, fig.1262. in p.1439.); to which is added the European walnut (*J. règia L.*, fig. 1257. in p. 1425.). The second section consists of such as have compound aments, and comprises eight species: the pacane-nut hickory (*Càrya olivæfórmis Nutt.*, fig. 1263. in p.1442.), the bitter-nut hickory (*C. amàra Nutt.*, fig. 1264. in p. 1443.), water bitter-nut hickory (*C. aquática Nutt.*, fig. 1265. in p. 1444.), mocker-nut hickory (*C. tomentòsa Nutt.*, fig. 1267. in p. 1445.), shell-bark hickory (*C. álba Nutt.*, fig. 1269. in p. 1446.), thick shell-bark hickory (*C. sulcàta Nutt.*, fig. 1271. in p.1449.), pig-nut hickory (*C. porcìna Nutt.*, fig. 1273. in p.1450.), and nutmeg hickory (*C. myristicæfórmis Nutt.*, fig. 1275. in p.1451.). The first three species of the second section bear some relation to those of the first in their buds, which are not covered with scales. For this reason, I have placed them immediately next, beginning with the pacane-nut hickory, which, by its numerous leaflets, most nearly resembles the black walnut and the butter-nut, the buds of which are also uncovered. Throughout the United States, the common name of hickory is given to all the species of the second section. This common appellation is due to certain properties of their wood; viz. coarseness of grain, and a reddish colour in the heart-wood, which, however modified, are possessed by them all, in a greater degree than by any other tree of Europe or America. These species exhibit, also, a striking analogy in their forms and in their leaves, though they differ in the number and size of their leaflets. To these sources of confusion must be added another in the fruit, which is often so various in its appearance, that it is easy to mistake the species to which it belongs. It is not, then, on the most remarkable differences alone that our distinctions must be founded; recourse must also be had to an examination of the shoots of the preceding year, of the buds, and of the aments." (*Michx. North Amer. Sylva*, vol. i. p. 139.)

§ i. *Simple Aments. Growth rapid.* 1. Jùglans règia *L.* 2. *J.* nìgra *L.* 3. *J.* cathártica *Michx.*, syn. *J.* cinèrea *L.* The order of the flowering of these species in England is, first *J.* règia, then *J.* cinèrea, in a few days after which the catkins of *J.* nìgra expand. The order of fruiting is different; for, while the fruit of the common walnut begins to drop in the first or second week in September, that of the black walnut does not fall till the end of the same month, and that of the grey walnut, not till the beginning of October. (*Mart. Mill.*) To this section may be added Pterocàrya, a genus recently separated from Jùglans.

§ ii. *Compound Aments, each Peduncle bearing three. Growth slow.* 1. Jùglans olivæfórmis *Michx.* (syn. Càrya olivæfórmis *Nutt.*) 2. *J.* amàra *Michx.* (*C.* amàra *Nutt.*) 3. *J.* aquática *Michx.* (*C.* aquática *Nutt.*) 4. *J.* tomentòsa *Michx.* (*C.* tomentòsa *Nutt.*) 5. *J.* squamòsa *Michx.* (*C.* álba *Nutt.*) 6. *J.* laciniòsa *Michx.* (*C.* laciniòsa *Nutt.*) 7. *J.* porcìna *Michx.* (*C.* porcìna *Nutt.*) 8. *J.* myristicæfórmis *Michx.* (*C.* myristici fórmis *Nutt.*)

⚘ 1. *J.* RE`GIA *L.* The royal, *or common*, Walnut Tree.

Identification. Lin. Hort. Cliff., p. 449.; Mill. Dict., No. 1. and Ic.; Du Roi Harbk., p. 323.; Willd. Arb., 155.; Willd. Sp. Pl., 4. p. 455.; Michx. N. Amer. Sylva, 1. p. 143.
Synonymes. Núx Jùglans *Dod. Pempt.*, 816.; Núx Jùglans, seu règia vulgàris, *Bauh. Pin.*, 417.; Noyer commun, *Fr.*; Noseguier *Provence*; gemeine Walnuss, *Ger.*
Engravings. Mill. Ic.; Lam. Ill., 781.; Ludw. Ect., t. 188.; Blackw., t. 247.; Knorr Del., 1. t. N. 7.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 3. t. 2.; Michx. N. Amer. Sylva, t. 29.; our *fig.* 1257.; and the plates of this tree in our last Volume.

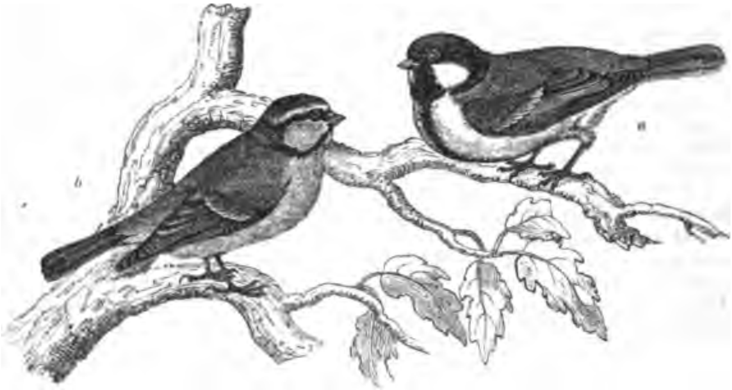
Spec. Char., &c. Leaflets in a leaf, 5—9; oval, glabrous, obscurely serrated. Fruit oval, situated upon a short inflexible peduncle. Nut rather oval, rather even. A native of Persia, in the extensive province of Ghilan, on the Caspian Sea, between 35° and 40° of latitude. In cultivation in England since 1562, and probably long before; flowering in April and May, and ripening its fruit in September.

Varieties.

⚘ J. *r.* 2 *máxima;* Núx Jùglans frúctu máximo *Bauh. Pin.*, 417., *N. Du Ham.*, iv. p. 173.; Noix de Jauge *Bon Jard.*, ed. 1836, p. 473., *Nois. Jardin Fruitier*, t. 16.; Bannut, *Warwickshire.* — This variety has the fruit double the size of that of the species, being sometimes nearly as large as a turkey's egg; but, in drying, the kernel shrinks to one half its size; and, hence, the fruit of this variety is not good for keeping, but ought to be eaten directly after being gathered. The leaves are large, and the tree has a magnificent appearance; but its timber is not nearly so durable as that of the common walnut.

⚘ J. *r* 3 *ténera;* Núx Jùglans frúctu ténero et frágile putámine *Bauh. Pin.*, 417., *N. Du Ham.*, iv. p. 173.; Noyer à Coque tendre, Noyer Mésange *Bon Jardinier*, l. c., Noyer de Mars *in Dauphiné. The thin-*shelled, or Titmouse, *Walnut.* (See *Hort. Trans.*, vol. iv. p. 517.; and *E. of Gard.*, ed. 1834, p. 942.) — The latter name is given to this kind of walnut, because its shell is so tender, that the birds of the titmouse family (mésange, *Fr.*) (Pàrus màjor *L.*, *fig.* 1256. *a*; P. cærùleus *L.*, *fig.* 1256. *b*; and also P. àter and P. palústris *L.*) pierce it with their bills, and eat the kernel, leaving the remaining part of the fruit on the tree. (See *Mag. Nat. Hist.*, vol. vii. p. 147.) This variety has the most delicate fruit of all the walnuts: it keeps longer, and produces more oil; but it is not so good a bearer as the other sorts. M. Trattinik, a German botanist, states, in the *Nouveau Du Hamel*, that he has seen a tree of the Jùglans règia which only produced female catkins, and never male ones; and that it bore every year a great quantity of fruit with a tender shell. It is known that the shells of walnuts are much more tender in some years than in others; and, also, that the shells often vary in their degrees of hardness on the same tree, in the same year; and, very likely, this may depend on

1256



fecundation: if so, the shells of the fruit of any walnut tree may be rendered tender, by removing all, or the greater part, of the male catkins, the moment they appear.

♀ J. *r.* 4 *serótina* Desf.; Núx Júglans frúctu serótino *Bauh Pin.*, 417., *N. Du Ham.*, iv. p. 174.; Noyer tardif, Noyer de la Saint-Jean *Bon. Jard.*, ed. 1836, p. 472., Noyer de Mai *in Dauphiné*. *The late-vegetating Walnut.* — This is a most valuable variety for those districts where the frosts continue late in spring. In France, about Paris, its leaves do not appear before the end of June; but the fruit ripens nearly as early as that of the other varieties. In the London Horticultural Society's Garden, there is a plant of this variety, 5 ft. or 6 ft. high, which, on the 1st of July, 1835, when every other tree in the garden was in leaf, had not burst a single bud.

♀ J. *r.* 5 *laciniàta*; Núx Jùglans fòliis laciniàtis *Reneaulm.*, *N. Du Ham.*, iv. p. 174.; Jùglans heterophýlla *Hort.*; *J. f*ilicifòlia *Lodd. Cat.*, ed. 1836; the Fern-leaved Walnut Tree, has cut leaves, somewhat like those of *Fráxinus* excélsior *s*alicifòlia.

Other Varieties. The above are the most remarkable and valuable of the varieties of the common walnut; the first three, on account of their fruit; and the last, as a curiosity, on account of its leaves. But in the *Bon Jardinier* five others are enumerated; and in the Horticultural Society's *Fruit Catalogue* for 1832 nine are given, of which the most valuable for cultivation for its fruit is the highflier; a variety which was originated at Thetford, in Norfolk, and which is held in much esteem in that county and in Suffolk. (*Hort. Trans.*, iv. p. 517.; and *E. of Gard.*, ed. 1835, p. 942.) There is also the Yorkshire walnut, which is much planted in that county. The varieties recommended by Mr. Thompson, as having proved the most prolific in the Horticultural Society's Garden, are, the round early oval; the double large French, No. 1. above; the tender-shelled, No. 2.; and the thick-shelled.

A variation, worth notice, was displayed in a nut sent to us by Mr. Samuel Taylor of Whittington, near Stoke Ferry, Norfolk, which had nearly three perfect valves, but was devoid of kernel.

Description. The walnut forms a large and lofty tree, with strong spreading branches. The leaves have three or four pairs of leaflets, terminated by an odd one, which is longer than the rest. The male catkins are pendulous, and are produced near the points of the shoots. The bark is thick, and deeply furrowed on the trunk; but on the upper branches it is grey and smooth. The leaves, when bruised, exhale a strong aromatic odour; and, in the extreme heat of summer, the exhalations from them are so powerful, as to produce unpleasant effects upon some persons, if they slumber under the

tree. The fruit is green and oval; and, in the wild species, contains a small hard nut. In the most esteemed cultivated varieties, the fruit is of a roundish oval and is strongly odoriferous; about $1\frac{5}{8}$ in. long, and from $1\frac{1}{4}$ in. to $1\frac{1}{3}$ in. in diameter. The nut occupies two thirds of the volume of the fruit. Towards autumn the husk softens, and, decaying from about the nut, allows it to fall out. The shell is slightly channeled, and, in most of the cultivated varieties, so thin as to be easily crushed by the fingers. The kernel is of an agreeable taste; and is covered with a fine pellicle, and separated by a thin partition, which may be readily detached both from the shell and from the kernel. The plant is somewhat tender when young, and apt to be injured by spring frosts: nevertheless, it grows vigorously; and, in the climate of London, attains the height of 20 ft. in 10 years, beginning about that time to bear fruit. The tree attains a great age, as well as size; and, as it advances in both, increases in productiveness. There is, perhaps, no tree that sends down a more vigorous taproot than the walnut; and this it will do in the clefts of rocks; and, when it reaches good soil, produce a most ample head, and so thick a trunk and root, as in time to burst even rocks. Hence, there is no tree less liable to be torn up by the roots than the walnut; and, for this reason, and also because it makes its shoots rapidly, instead of continuing to elongate them all the summer, like some other trees (such as the larch, the oak, the poplar, &c.), it forms an erect well-balanced tree, even in exposed situations. The walnut is generally considered injurious, by its shade, both to man and plants. Pliny says that even the oak will not thrive near the walnut tree; which, if it be true, may be owing to the interference of their roots in the subsoil: but it is certain, that neither grass, nor field nor garden crops, thrive well under the walnut. The late Mr. Keen, an extensive market-gardener at Isleworth, being the owner of the land he cultivated, planted, about the beginning of the present century, a number of rows of walnut trees, at considerable distances from each other, across his grounds, in order at once to produce shelter to his herbaceous crops, and fruit for the market. He was celebrated for the growth of strawberries; and Mr. Phillips, the author of *Pomarium Britannicum* (published in 1820), says that Mr. Keen informed him that the walnut trees were so injurious to his strawberry beds, that the plants seldom bore fruit in their neighbourhood. The injury done to grass, and other plants on the surface of the ground, must be chiefly owing to the decaying of the fallen leaves, and the washing into the soil of their astringent properties; consequently, the evil may be much alleviated by sweeping them up, and carrying them away as soon as they fall.



1257

Geography and History. The walnut is a native of Persia; and, according to Loureiro, of the north of China. Pallas found it frequently in the Peninsula of Taurida, and on the south of Caucasus, growing spontaneously to a large size, so as to appear almost indigenous; the fruit ripening about the end of August. The elder Michaux, who, in the years 1782, 1783, and 1784, visited the province of Ghilan, was the first in modern times to ascertain, with certainty, that the walnut belonged to the same country as the peach and the apricot. It was known to the Greeks, whose names for it were Persicon and Basilicon, the Persian and royal nut. According to Pliny's account, the

Greeks afterwards called the walnut tree Caryon, on account of the heaviness of the head produced by its strong smell. When the walnut was introduced into Europe is altogether uncertain; but it was cultivated by the Romans before the death of the Emperor Tiberius, and is supposed to have been brought from Greece by Vitellius. Strabo informs us that in Rome, at one time, tables of the wood sold at a higher price than those of citron. Ovid wrote a little poem, entitled *De Nuce*, by which it appears that then, as now, walnuts were knocked down from the trees by boys; and that, at marriages, walnuts were thrown by the bride and bridegroom among the children who surrounded them; a ceremony which was instituted to show that the bridegroom had left off his boyish amusements; or, perhaps, to signify that the bride was no longer a votary of Diana. (See p. 1430.) Hence, probably, is derived the French word for nuptials, *des nôces*. In France, at the festival of the Rosière at Salency, in the department of the Oise (see p. 792.), in the sixth century, it is directed that an offering be presented to the young maid who is crowned, composed of walnuts and other fruits of the country. The walnut tree is now to be met with in every part of Europe, as far north as Warsaw; but it is nowhere so far naturalised as to produce itself spontaneously from seeds. In Britain, it has been in cultivation from the earliest period of botanical history, and, in all probability, since the time of the Romans. It ripens its fruit in fine seasons, in the neighbourhood of Edinburgh, as a standard; and it lives against a wall as far north as Dunrobin Castle, in Sutherlandshire. It is much cultivated, in some parts of Italy, France, Germany, and Switzerland, as a road-side tree. Michaux says that it is more abundant in those parts of France which lie between 45° and 48°, than in any other part of Europe; and that the fruit, the oil, and the wood may be considered as forming, in that region, some of the principal branches of commerce. This corresponds with what is stated by Evelyn. "Burgundy," says that author, "abounds with walnut trees, where they stand in the midst of goodly wheat lands, at sixty and a hundred feet distance; and so far are they from hurting the crop, that they are looked upon as great preservers, by keeping the ground warm; nor do the roots hinder the plough. Whenever they fell a tree, which is only the old and decayed, they always plant a young one near him; and, in several places, betwixt Hanau and Frankfort, in Germany, no young farmer whatsoever is permitted to marry a wife, till he bring proof that he is a father of such a stated number of walnut trees; and the law is inviolably observed to this day, for the extraordinary benefit which this tree affords the inhabitants." (*Hunter's Evelyn*, p. 168.) "The Bergstrass," he adds, "which extends from Heidelberg to Darmstadt, is all planted with walnuts." (*Ibid.*, vol. i. p. 168. and p. 170.)

At different periods, there has been a great dearth of the wood of this tree in France, where, as in England, in time of war, it was much in demand for gun-stocks. It is a remarkable fact in the history of this tree, that, in the winter of 1709, the greater part of the walnut trees of Europe, and more especially of Switzerland, France, and Germany, were killed; or so far injured, as to render it advisable to fell the trees. The Dutch, at that time, foreseeing the scarcity of walnut timber that was likely to ensue, bought up all the trees that they could procure, in every direction, and sold them again, according to the demand, for many years afterwards, at a greatly advanced price. In the year 1720, an act was passed, in France, to prevent the exportation of walnut timber, on pain of confiscation, and payment of a fine of 3,000 livres. A great many walnut trees were, at that time, planted in the royal demesnes. In 1806, the manufacture of muskets required about 12,000 trees yearly. In consequence of this, a great many plantations were made by individuals; and a prize was given for the cultivation of the tree by the Society for the Encouragement of Arts, in Paris. We have been informed by M. Michaux, in a letter dated December, 1834, that in 1818 he formed a nursery of between five and six acres, for government, in the Bois de

Boulogne, and raised in it upwards of 30,000 walnut trees, for transplantation, which, at the time he wrote, were from 20 ft. to 30 ft. high.

In England, formerly, Evelyn informs us, " there were considerable plantations of this tree, particularly on the chalk hills of Surrey." He instances those of Sir Richard Stidolph, near Leatherhead; Sir Robert Clayton, at Morden, near Godstone, once belonging to Sir John Evelyn; and the country about Carshalton. During the late war, great numbers of walnut trees, in different parts of England, were cut down for the purpose of supplying gun-stocks; till the price of walnut timber rose so high (600*l.* having been given for one large tree), as to induce its importation from the Continent, and the substitution of the wood of the black walnut of America. In the present day, when mahogany and other tropical woods are substituted for walnut wood by the cabinet-makers, and when wood for gun-stocks is imported from the Black Sea, and also from North America, the profits attending the culture of the common walnut tree are greatly diminished; and it is, accordingly much less generally planted as a timber tree. As a fruit tree, its planting is, perhaps, on the increase; the improved varieties becoming better known. In North America, the European walnut has been planted for its fruit; and Michaux recommends it to be budded on the black walnut; but, as the wood of the former is considered as being far inferior to that of the latter, he does not recommend its introduction into the United States as a forest tree. Walnuts for the table are now annually imported from France and Spain; and pay a duty of 2*s.* per bushel. The quantity imported in 1831 was 23,578 bushels, of which 160 bushels were exported, and the remainder retained for home use. In 1832, only about two thirds of the quantity were imported; but 551 bushels were exported. (*M'Culloch's Comm. Dict.*, p. 1218.) This variation, in respect to the importation and exportation of the walnuts, is owing to the variations in the crop on the Continent and in Britain.

Properties and Uses. The wood of the walnut weighs 58 lb. 8 oz. in a green state; and when dried, 46 lb. 8 oz. It is white in young trees, and in that state is subject to be wormeaten; but, as the tree grows old, the wood becomes solid, compact, easy to work, and acquires a brown colour, veined, and agreeably shaded with light brown and black. In this state, it is considered the most beautiful wood produced in Europe; and, being neither subject to crack nor twist; it was employed in preference to every other for the best kinds of furniture, before the discovery, in America, of other kinds of wood still more beautiful. In France and Germany, it is still much sought after by turners, cabinet-makers, joiners, coachmakers, and millwrights, for screws to presses; by the makers of sabots, or wooden shoes, or clogs, musical instrument makers, and, above all, by the manufacturers of arms. For solidity and beauty, the wood of those trees is preferred which have grown on hilly and poor soils; that grown on plains, and in rich soils, being of a much coarser grain, and being less beautifully veined, and less durable. The smallest size of trunk that can be employed in making furniture with advantage, in point of beauty, is 1½ ft. in diameter. The white, or soft, wood may be rendered fit for use by immersing it in boiling walnut oil. The most beautiful veinings are in the roots of the tree; which are much sought after by cabinet-makers, and, when they can be found of large size, bear a high price. The younger timber, Evelyn says, is held to make the better-coloured work; but the older, and especially the firm and close timber about the root, is best adapted for " flaked and cambleted works." Those trees, he says, which have small and thick-shelled fruit produce better timber than the large-fruited or thin-shelled kinds. Evelyn strongly recommends walnut timber for household furniture, utensils, and wainscoting walls, " instead of the more vulgar beech, subject to be weak and unsightly; but which, to counterfeit and deceive the unwary, they wash over with a decoction of the green husks of walnuts, &c." In France, he says, it may be seen in every room, both of poor and of rich; but he is in raptures with the cabinet-works which he has seen made of the walnut wood of

Grenoble, "of all others the most beautiful and esteemed." To render the wood better coloured, Evelyn continues, "joiners put the boards into an oven after the batch is forth, or lay them in a warm stable; and, when they work it, polish it over with its own oil, very hot, which makes it look black and sleek; and the older it is, the more estimable: but then it should not be put in work till thoroughly seasoned; because it will shrink beyond expectation. It is only not good to confide in it much for beams or joists, because of its brittleness; of which, however, it has been observed to give timely notice, like that of the chestnut, before it breaks." (*Hunt. Evel.*, p. 172.) For fuel, according to Baudrillart, the wood, when dry, is of nearly the same value as that of the common sycamore, burning with a mild flame; but, as charcoal, it is not productive. In Britain, the chief uses of the timber are for gunstocks (it being found lighter in proportion to its strength and elasticity than any other), and for musical instruments, turnery, and toy-making.

The most valuable part of the walnut is its fruit, which is much in demand, throughout Europe and other parts of the world, for the table, and for various other purposes. In a young and green state, it is pickled and preserved; and, when mature, it is used as food for the poorer classes in the countries where it abounds, and at the dessert of the richer classes. In the north of Italy, in Switzerland, and in the south of France, the roads are lined for many miles together with walnut trees; and, during August and September, when the fruit is ripe, or nearly so, and the weather so warm that the shelter of a house is not required to protect the traveller from cold, he may walk under the shade of the tree, and eat its fruit during the day, and sleep under it during night. We have even known the case of a person who travelled by a public conveyance from Florence to Geneva, eating scarcely anything by the way but walnuts and heads of maize, which he gathered by the road side. About the end of June, walnuts are preserved, either with or without their husks: in the latter state they are most agreeable, but in the former most strengthening to the stomach. Gerard says, "The green and tender nuts, boyled in sugar, and eaten as suckarde, are a most pleasant and delectable meate, comfort the stomache, and expell poyson." A fine stomachic liqueur is made from the young nuts about the middle of June; and about this time, also, they are pickled. In August, before the shells become hard, they are eaten in what the French call *en cerneaux*, that is, with the kernel, while green, scooped out with a short, broad, brass knife, and seasoned with vinegar, salt, pepper, and shallots. The nuts, for this purpose, should be taken at least a fortnight before they are ripe; they should be thrown into water as soon as they are separated from the husk, and allowed to remain there till the moment when they are wanted to be seasoned and set upon the table. The seasoning may be that already mentioned; or the juice of green grapes and salt, without anything else. Towards the end of September, or beginning of October, walnuts are eaten raw, and they are good as long as they continue fresh; that is, as long as it is easy to detach the skin from them; but when this cannot be removed, the nuts become indigestible, and their acridity attacks the gums and the palate. In order to preserve them fresh, they ought to be buried, with their green shells on, in sand or in dry soil, beyond the reach of frost or surface heat, in which state they will continue fresh for six months. Of the dried kernels, a *conserve brûlée* is formed; which, in France, is called *nougat*, and is considered very agreeable. In Spain, Evelyn tells us, they strew the gratings of old and hard nuts over their tarts and sweetmeats. In London, young walnuts are much used for pickles, and in making catchups, or adulterating soy, and other sauces. The nut of the large-fruited walnut (*jauge*, Fr.; the variety No. 1. above) is, in France, made into cases by jewellers, and furnished with trinkets, for the amusement of children. In Limerick, it is customary to put a pair of fine Limerick gloves into a walnut shell, and a dish of walnuts with this kind of kernel is sometimes presented at table. Thus furnished, they are often sent as presents to England; and gloves are sent in the same manner from France.

The most general use of the walnut on a large scale, in the south of Europe, is

to express an oil from it, which is employed by artists in mixing white, or any delicate colours; and which serves as a substitute for olive oil in the kitchen and at table, for oil of almonds in medicine, and for burning in lamps. Half the people in France, Bosc observes, consume no other oil than that of the walnut. The marc, or mass of husks which remains after the oil is extracted, is used to feed swine or sheep, or is formed into cakes, and serves for the nourishment of poultry; and the inhabitants of the Mirbalais make a kind of candles of it, which burn with a very clear flame. In Tartary, Dr. Clarke informs us, an incision is made in the tree in spring, when the sap is rising, and a spigot inserted for some time; after which, on withdrawing it, a clear sweet liquor flows out, which, when coagulated by evaporation, is used as sugar. In other parts of Europe and Asia, a wine is made of the sap, or a spirit distilled from it. The roots of the walnut, before the rising of the sap, yield, by boiling, a dark brown dye, which becomes fixed, in wood, hair, or wool, without the aid of alum. This dye is used by gipsies, and also by theatrical performers, to stain the skin of a deep brown. The husk of the nut produces nearly the same colour as the root, and also the bark of the young shoots, and even the leaves. For this purpose, the bark should be taken off when the sap is in movement in spring; the leaves should be gathered when the nuts are half formed; and the husks of the nuts when the fruit is nearly ripe, or after its maturity, when they begin to scale off. The husk of the nuts is used by cabinet-makers and joiners, to stain white wood and yellow wood of a dark brown or black colour, like that of the walnut. When the fingers are stained with walnut juice, or the skin has been dyed with it, it is exceedingly difficult to remove; but this may be partially effected by the application of moistened salt.

To obtain a dark-brown or black Dye from the Walnut, the husks must be left to rot, or to macerate, in a heap in the shade, taking care to keep them always moist. When they are sufficiently rotted and black, they are then boiled, adding to them fresh water, and supplying them with a sufficient quantity of it. This gives a most beautiful nut colour to any kind of wood, which may be made lighter or darker, as may be wished, by employing a greater or less quantity of husks to the same quantity of water; or the wood may veined by applying the colour with a pencil to particular parts; after which it is varnished. When it is wished to colour the boarded floor of an apartment, the husks are boiled, and no more water added than is sufficient to keep the bottom of the vessel from being injured by the fire. When the whole is reduced to one mass, it is laid on the boards, and left to dry; it is then swept off, and the wood rubbed with hard, short-bristled brushes, till it becomes perfectly bright.

To extract the Oil of Walnuts. When the fruit is gathered, and the nuts are separated from the husks, they should be kept dry, and occasionally moved till they are used. The most proper time for the operation is at the close of winter; as, at this season, the change by which the mucilage of the fruit is converted into oil has been completely effected; and by longer delay the kernel grows rancid, and the oil becomes of a vitiated quality. The nut is cracked by striking it on the end with a small mallet; and pains are taken not to bruise the kernel. The slight ligneous partition is detached, and such kernels as are partially spoiled are picked out and thrown aside. The sound kernels, thus cleared from every particle of the shell, should be sent immediately to the mill, as they soon become rancid by exposure to the air. They are crushed by a vertical stone, which turns in a circular trough, and is moved by a horse, or by water. The paste is next enclosed in bags of strong linen, and submitted to the press. The oil which flows from this first pressure, without the application of heat, is of the best quality. It is very clear, and is proper for food; but it sensibly retains the taste of the nut, which, in general, is not agreeable to persons unaccustomed to it; so that the consumption is limited to the departments where it is made. To be kept sweet for the table, it should be drawn off several times during the first months, carefully corked, and kept in the cellar, as it is more easily affected than any other oil by the action of air and heat. After the first expression, the paste is emptied from the sacks, moistened with warm water, and moderately heated in coppers. It is then replaced in the sacks, and returned to the press. The oil of the second discharge is highly coloured, and very speedily becomes rancid; it is therefore employed only in the preparation of colours. The cakes which remain after the expression is finished are used, as already stated, for fattening swine, sheep, or fowls, or making candles. The principal use of this oil is in the preparation of fine colours: it is preferred for this purpose, on account of the complete and rapid manner in which it dries, and of the facility with which it is obtained in a perfectly limpid state, which is done by diffusing it upon water in large shallow vases.

In copperplate printing, walnut oil is considered, in Paris, indispensably necessary for a fine impression, whether in black or in colours. But there are peculiar modes of preparing it for the several colours with which it is to be mixed. Thus, for white, blue, light, and the intermediate shades, it is reduced by boiling to two thirds of its bulk; but for dark green and black, to one fifth, which leaves it a thick semifluid substance. To facilitate the process, one tenth part of linseed oil is added to it: it is then placed, in an iron or copper vessel over a strong clear fire. When it begins to boil rapidly, the vessel is removed, and the oil takes fire by contact with the flame, and burns till it is reduced to the proper consistency. Sometimes it is not allowed to kindle, but, when the ebullition commences, crusts of bread are thrown into it, which remain till the necessary evaporation is effected, and are then taken out, charged with mucilaginous particles. The principal advantage of this oil, in the preparation of white lead for painting the interior of houses, as well as of the colours employed in copperplate printing, is the longer and more perfect preservation of the tints. The back of prints done with it, also, does not turn yellow like others. (*Michx. N. Amer. Sylva*, 147, 148.)

One bushel of nuts will yield 15 lb. of peeled and clear kernels, and these half as many pounds of oil. The small thick-shelled fruit, other circumstances being the same, always yields more oil in proportion to their bulk, than the large, or thin-shelled, fruit. A very interesting account of the mode of preparing the walnuts for being crushed for oil, and of the various uses to which the fruit is applied in Piedmont will be found in Bakewell's *Travels in the Tarentaise*.

Alkaline Ashes. A full-sized walnut tree, Bosc, in 1822, states, will produce two sacks of nuts, worth 12 francs; and, if the leaves which fall, or are knocked down from the tree, are burned, they will give a third part of their weight in pot-ashes, which are valued at 6 francs; thus giving a total increase per annum which, at 6 per cent, represents a capital of 300 francs. The tree, the same author states, is particularly valuable for a cultivator without much floating capital; for he has known repeatedly a product in fruit and ashes of 400 francs, procured at a total expense of not more than 36 francs; and that this sum was expended almost entirely in manual labour, with scarcely any aid from building or machinery.

Medicinally, the use of the walnut is of the greatest antiquity. It is said to have been one of the antidotes used by Mithridates. Pliny recommends it "for driving worms out of the stomach;" and adds that, "eaten after onions, they keep them from rising." (Book xxiii. c. 18.) An extract of the unripe fruit is used by rustic practitioners for the destruction of worms: the fruit itself is stomachic; and the bark, either green, or dried and powdered, is a powerful emetic. The root is said to be purgative and diuretic; and a decoction of the wood, sudorific. The sap of the leaves, mixed with milk, is considered a remedy for horses having the fistula. Evelyn tells us that the husks and leaves, being macerated in warm water, and that liquor poured on grass walks and bowling-greens, infallibly kills the worms, without endangering the grass. Not, says Dr. Hunter, that there is anything peculiarly noxious in this decoction, but worms cannot bear the application of anything bitter to their bodies; which is the reason that bitters, such as gentian, are the best destroyers of worms lodged in the bowels of animals. Worms are seldom observed in the intestines of the human body, except in cases where the bile is either weak or deficient. (*Hunter's Evel.*, p. 178. note.) Philips states that anglers water the ground with a decoction of walnut leaves, to cause the worms to come to the surface of the ground, when they pick them up for bait. The leaves, dried and mixed with those of tobacco, are said to have similar virtues to those of that plant. An extract of the unripe fruit, and also a rob prepared from its juice, are laxative; and the vinegar in which walnuts have been pickled is a very useful gargle.

Poetical and legendary Allusions. The walnut tree was dedicated to Diana, and the festivals of that goddess were held beneath its shade. The Greeks and Romans, as before observed, strewed walnuts at their weddings. Horace, Virgil, Catullus, and many of the other Latin poets, allude to this custom, which probably had reference to the bride's deserting the ranks of Diana (to whom, as we have seen above, the walnut was dedicated,) for those of Hymen (see p. 1426.); and there is an allusion to it in Herrick's *Epithalamium* on Sir Thomas Southwell and his lady: —

> "Now bar the door — the bridegroom puts
> The eager boys to gather nuts."

Spenser mentions walnuts as employed in Christmas games; and many other British poets mention it for different qualities. Cowley, however, has enumerated so many of the properties, which the walnut was believed to possess in his day, that we give the passage entire: —

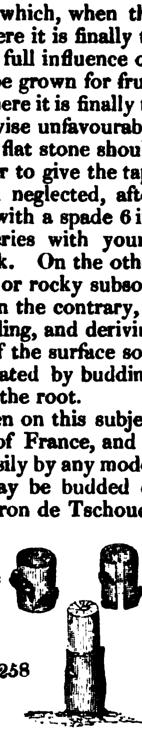
> "The walnut then approached, more large and tall,
> Her fruit which we a nut, the gods an acorn call:
> Jove's acorn, which does no small praise confess,
> T've called it man's ambrosia had been less;
> Nor can this head-like nut, shaped like the brain,
> Within be said that form by change to gain,
> Or Caryon called by learned Greeks in vain:
> For membranes soft as silk her kernel bind,
> Whereof the inmost is of tenderest kind,
> Like those which on the brain of man we find.
> All which are in a seam-joined shell enclosed,
> Which of this brain the skull may be supposed.
> This very skull enveloped is again
> In a green coat, her pericranium.
> Lastly, that no objection may remain,
> To thwart her near alliance with the brain,
> She nourishes the hair, remembering how
> Herself deform'd, without her leaves does show,

> On barren scalps she makes fresh honours grow,
> Her timber is for various uses good;
> The carver she supplies with useful wood.
> She makes the painter's fading colours last;
> A table she affords us, and repast;
> E'en while we feast, her oil our lamp supplies;
> The rankest poison by her virtues dies,
> The mad dog's foam, and taint of raging skies.
> The Pontic king, who lived where poisons grew,
> Skilful in antidotes, her virtue knew.
> Yet envious fates, that still with merit strive,
> And man, ungrateful from the orchard drive
> This sovereign plant; excluded from the field,
> Unless some useless nook a station yield,
> Defenceless in the common road she stands,
> Exposed to restless war of vulgar hands;
> By neighbouring clowns, and passing rabble torn,
> Batter'd with stones by boys, and left forlorn."
>
> COWLEY'S *Plants*, book iv.

Collinson, in his *History of Somersetshire*, speaking of the Glastonbury thorn, mentions that there grew also, in the Abbey-church yard, on the north side of St. Joseph's Chapel, a miraculous walnut tree, which never budded forth before the feast of St. Barnabas (that is the 11th of June), and on that very day shot forth its leaves, and flourished like other trees of the same species. He adds that this tree was much sought after by the credulous; and that "Queen Anne, King James, and many of the nobility of the realm, even when the times of monkish superstition had ceased, gave large sums of money for small cuttings from the original." (*Hist. of Som.*, vol. ii. p. 265.) This tree was, no doubt, of the late variety called by the French *Noyer de la St. Jean.*

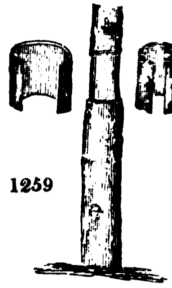
Propagation, &c. The species is propagated by the nut; which, when the tree is to be grown chiefly for its timber, is best sown where it is finally to remain, on account of the taproot, which will thus have its full influence on the vigour and prosperity of the tree. Where the tree is to be grown for fruit on dry soils, or in rocky situations, it ought also to be sown where it is finally to remain, for the same reasons. In soils on moist or otherwise unfavourable subsoils, if sown where it is finally to remain, a tile, slate, or flat stone should be placed under the nut at the depth of 3 in. or 4 in., in order to give the taproot a horizontal direction; or, if this precaution has been neglected, after the plants have come up, the taproot may be cut through with a spade 6 in. or 8 in. below the nut, as is sometimes practised in nurseries with young plants of the horsechestnut, sweet chestnut, walnut, and oak. On the other hand, when the walnut is planted in soil which has a dry or rocky subsoil, or among rocks, no precaution of this sort is necessary: on the contrary, it would be injurious, by preventing the taproot from descending, and deriving that nourishment from the subsoil which, from the nature of the surface soil, it could not there obtain. The varieties may be propagated by budding, grafting, inarching, or layering, and, possibly, by cuttings of the root.

Budding and Grafting the Walnut. Much has been written on this subject by French authors; from which it appears that, in the north of France, and in cold countries generally, the walnut does not bud or graft easily by any mode; but that, in the south of France, and north of Italy, it may be budded or grafted by different modes, with success. At Metz, the Baron de Tschoudy found the flute method (*fig.* 1258.) almost the only one which he could practise with success. By this mode, an entire ring of bark, containing one or more buds, is put on the upper extremity of the stock; either exactly fitted to it, as at *fig.* 1258. *a*; or made to fit it by slitting up the ring of bark, if too small for the stock, as at *b*; or, if too large, by slitting it up, and cutting out a small portion, so as that, when placed on the stock, it may fit it as closely as in the entire ring *a*. When this mode of budding is practised without heading down the stock, as in *fig.* 1259., it is called ring budding, *greffe en anneau*. Both flute budding and ring budding are generally practised in spring, when the sap is in motion;



1258

but they may be also carried into effect in summer, at the ordinary season. In Dauphiné, young plants in the nurseries are budded chiefly by the above modes, which succeed best the closer the operation is performed to the collar of the plant. It has also become customary, of late, in that part of France, to cover the branches of old trees with buds. For this purpose, the branches are shortened in the month of October, or in May, to within 8 ft. or 10 ft. of where they proceed from the trunk, in order that they may throw out a number of young shoots. The spring afterwards, when the sap is in motion, from 50 to 100 of these shoots are made choice of, and budded either in the common manner, or in the flute or ring method. The two latter modes are preferred, as being more certain of success, and less likely to have the young shoots blown off by the wind. When the common method is practised, the young shoots are pinched in once or twice in the course of the season, to prevent them from elongating to such an extent as to endanger their being blown off. In England, the walnut is very seldom either budded or grafted; and, though Boutcher recommends inarching, we believe it has been practised only on a very limited scale. In Jersey, we are informed by Mr. Saunders, nurseryman there, the walnut and the sweet chestnut are sometimes, but very rarely, grafted; and that, to insure success, the operation must be performed while the stock is young, and the scion must be about the same size as the stock. The graft should be made close to the ground, and not till late in the spring, when the sap is in full motion. Mr. Knight succeeded in budding the walnut by making use of those minute buds which are found at the base of the annual shoots of the walnut and other trees, "which are almost concealed in the bark, and which rarely, if ever, vegetate, but in the event of the destruction of the large prominent buds which occupy the middle and opposite ends of the annual wood." Mr. Knight inserted in the stock these minute buds, in the usual manner, in several instances, and found them invariably succeed; but it is necessary to state that the operation was performed on yearling stocks, which grew in pots that had been placed, during the spring and early part of the summer, in a shady situation under a north wall, in order to retard them; and which were removed, late in July, to a forcing-house, and instantly budded with buds, which, as before observed, had been taken from the base of the current year's shoots. M. Bosc, noticing this mode of Mr. Knight's, says that he has long remarked that buds placed immediately on the collars of the roots always succeed; which he attributes to the shade and the humidity which that situation affords. It appears to us that Bosc's mode, provided flute or ring budding were substituted for the common method, and each graft were covered with a hand-glass, is the one most likely to be successfully practised in the climate of Britain. Layering or inarching might, doubtless, be adopted with success in the case of the common walnut, as they are found to succeed with Pterocàrya caucásica *Kunth* (Jùglans *f*raxinifòlia *Lam.*) and the cut-leaved walnut. Indeed, whip grafting is successfully practised with the cut-leaved variety, in Sedy's Nursery, at Lyons, and in other gardens in the south of France.



1259

Grafting the Walnut. This operation has been successfully performed by T. A. Knight, Esq. "Young, or last year's, wood is employed both as the scion and as the stock; and both scion and stock are allowed to unfold their buds, and grow for a week or ten days, before the operation of grafting is performed. Previously to doing this, the young shoots and foliage are rubbed off. Out of 28 instances, 22 grew well, many producing shoots of nearly a yard long, and of very great strength. 'The scions were attached to the young (annual) wood of stocks, which were between 6 ft. and 8 ft. high, and in all cases they were placed to stand astride the stocks, one division of the scion being in some instances introduced between the bark and the wood;

and both divisions being, in others, fitted to the wood and bark in the ordinary way. Both modes of operating were equally successful. In each of these methods of grafting, it is advantageous to pare away almost all the wood of both the divisions of the scions; and, therefore, the wide dimensions of the medulla, in the young shoots of the walnut tree, do not present any inconvenience to the grafter.' (*Trans. Hort. Soc.*, 2d ser., vol. i. p. 216.)"

Culture. The nuts may be sown as soon as gathered, if there is no danger from vermin; but, if there is, it is better to defer sowing till February. The most convenient mode is to deposit the seed in drills, 2 ft. apart from each other, placing the seeds at from 3 in. to 6 in. apart in the drills. The advantage of sowing in drills is, that the plants, being all at some distance from one another, come up with greater vigour, and their taproots may be shortened about midsummer, by inserting a spade on each side of the drill in a slanting direction, so as to cut off their points. In France, in some cases, the nuts are germinated in a heap before sowing; and the points of the taproots are pinched off with the finger and thumb, as is done with almonds. (See p. 678.) Whether the nuts are sown in drills or broad-cast, almost the only attention required in their culture while in the nursery is, to shorten once a year their tap, or main, roots, in order to induce them to throw out fibres, for the purpose of facilitating their transplantation. No tree requires less pruning than the walnut, either in a young or in a mature state; though there can be no doubt that in the case of this tree, as in that of all others, thinning out some of the shoots will add vigour to the leaves and fruit of those which remain. Evelyn mentions, that he had been told by an industrious and very experienced husbandman, that, if walnut trees be transplanted as big as one's middle, it may be done safer than when younger; and Bosc, in the *Nouveau Cours d'Agriculture*, recommends them not to be removed from the nursery till the stems have attained the height of 5 ft. or 6 ft. from the ground, and are 5 in. or 6 in. in diameter. Pits, he says, ought to be previously dug for the trees, 8 ft. in diameter, and 3 ft. deep, and the soil exposed to the air some months before the time of transplanting. When the planting is performed in autumn, all the branches may be left on till spring; because the severity of the winter would injure the wounds made by cutting them off. Early in spring, before the sap begins to rise, the head of the tree is entirely cut off, leaving only a main stem terminating in the stumps of the principal branches. The wounds in these stumps are carefully covered with plaster composed of loam and cowdung, or grafting clay, secured from the weather by straw and cords, or by a board nailed over the plaster, and cemented on the edges; because the wood of the walnut, especially that of the young trees, is so spongy and porous, that it is more easily injured by the weather than that of most other trees. The nails, being driven into the heart-wood, do no kind of injury to the tree, that wood having lost its vitality. Trees headed down and treated in this manner, in France, push out shoots of great vigour the first year; and these being thinned out, or rubbed off, the remainder soon form a head, the branches of which so completely obliterate the wounds made by the decapitation which took place at transplanting, as to render it next to impossible to discover where they were situated. This, indeed, takes place with all the road-side trees in France, which are headed down in a similar manner when they are transplanted. As the winters in England are less severe than they are in the greater part of the Continent, or, at least, are attended by a moister atmosphere, large wounds are less liable to become cracked or otherwise injured by severe frost. Hence, when walnut trees, or any other trees, of very large dimensions, are transplanted in Britain, they may be headed down immediately on removal, without any fear of the consequences. This will give the trees the advantage of the winter for the preparation, or swelling, of the buds which are to form the next year's shoots; because it must not be forgotten, that in trees, as in all other plants, the sap is in motion, to a certain extent, during the whole winter.

Soil and Situation. The walnut tree attains the largest size in a deep loamy

soil, dry rather than moist; but the fruit has the best flavour, and produces most oil, when the tree is grown in calcareous soils, or among calcareous rocks: in a wet-bottomed soil, whatever may be the character of the surface, it will not thrive. The walnut is not a social tree, and neither produces good timber nor fruit when planted in masses. Both on the Continent and in England, it succeeds well as an avenue or road-side tree; and it forms an excellent shelter for orchards and kitchen-gardens, when planted at such a distance as not to injure them by its roots or by its shade. In ornamental grounds, the somewhat light yellowish and shining green foliage of the walnut forms a fine contrast with that of other trees, throughout the greater part of the season; and the symmetrical form of the head accords well with buildings.

Gathering and keeping the Fruit. The fruit of the walnut, both in France and in England, is commonly knocked down from the tree by thrashing the extremities of the branches (on which alone it is produced) with long poles. By this process, Mr. Rogers observes, "many of the points of the branches are broken, which causes the production of many spur-like shoots, that afterwards bear flowers and fruit. Hence the custom of beating a barren tree to make it bear." (*Fruit Cult.*, p. 380.) Bosc considers that beating down the fruit with poles is injurious to the tree; but, in France, he adds, as the trees are not in enclosures, this barbarous practice is altogether unavoidable. If the trees were enclosed, he continues, or if property exposed by the road sides were sufficiently respected, it would be unnecessary to beat down the nuts at all, as the wind alone, when the fruit is completely matured, would be quite sufficient to detach it from the tree. This has suggested to us the idea of using long rods, with a contrivance at their extremities for taking fast hold of the branches, so as to admit of shaking them powerfully, and thus obtaining by art the effect of a violent wind. In gathering up the fruit which has been either beaten down, or fallen naturally, those nuts which have separated from the husks are kept by themselves, taken home, and spread out on a boarded floor in an airy shed or granary, to the depth of 3 in. Here they are turned over daily, till they become perfectly dry. Those fruits from which the husks have not separated in falling are placed in little heaps on the ground, but still under cover; and turned over, and gently beaten, till the husk separates. In France care is taken to prevent these heaps from fermenting, or sweating, as it is called; because that occasions a change in the kernel, and gives a taste to the oil. When the nuts have been thoroughly dried, those not wanted to crush for oil are laid by, often in wooden boxes or chests, where they are not subject to the vicissitudes of the atmosphere; in which state they will retain all their good qualities for about twelve months. In Britain, the nuts of the walnut may be preserved fresh and fit for the table, or for sowing, for a year; either by burying them in dry soil or sand, so deep as not to be reached by frost, by the heat of the sun, or by rain; or by placing them in dry cellars, and covering them with straw. The latter mode is that most commonly adopted by the growers of this nut for the London market. Walnuts, Rogers observes, should not be gathered till the outer covering parts readily from the shell, which is before that covering becomes mealy. There is a critical time at which the covering leaves the shell without staining it, which it is apt to do if allowed to remain on till it becomes soft. After being shelled, the nuts should be well dried in the sun for a day or two, and then stored away, either on shelves in an airy room, or packed in jars or boxes, among dry white sand, which improves the colour of the shell, and keeps the kernel more moist. When the nut is to be preserved through the winter, for the purpose of planting in the following spring, it should be laid in a rot-heap as soon as gathered, with the husk on; and the heap should be turned over frequently in the course of the winter. We have entered into greater details respecting the various uses of the timber and fruit of the walnut, partly because they are less generally known in Britain than those of most other fruit-bearing

timber trees; but chiefly, because we think the tree well adapted for cultivation in Australia.

Statistics. Jùglans règia in the Environs of London. At Ham House, Essex, it is 72 ft. high, diameter of the trunk 3 ft. 3 in., and of the head 68 ft.; at Chiswick, it is 65 ft. high; and in various gardens about Isleworth and Twickenham, from 60 ft. to 80 ft.

Jùglans règia South of London. In Devonshire, at Killerton, it is 55 ft. high, diameter of the trunk 2 ft., and of the head 98 ft.; at Cothelstone, it is 64 ft. high, diameter of the trunk 6½ ft., and of the head 97 ft. In Dorsetshire, at Melbury Park, 200 years old, it is 66 ft. high, diameter of the trunk 3 ft., and of the head 58 ft. In Hampshire, at Testwood, 70 years old, it is 40 ft. high, diameter of the top 3 ft., and of the head 59 ft. In Kent, at Cobham Hall, is a walnut tree with a fine spreading head and immensely large limbs, the diameter of the trunk 5 ft., and of the head 90 ft. In Somersetshire, at Nettlecombe, 40 years planted, it is 38 ft. high; at Brockley Hall, two trees, 70 ft. high, diameter of the trunk of one 5 ft. and of the other 4 ft. 7 in. In Sussex, at Cowdray, diameter of the trunk 5 ft., and of the head 40 ft. In Wiltshire, at Wardour Castle, 100 years old, it is 60 ft. high, diameter of the trunk 4 ft. 8 in., and of the head 49 ft.; at Longford Castle, it is 60 ft. high, diameter of the trunk 3½ ft., and of the head 75 ft.

Jùglans règia North of London. In Bedfordshire, at Woburn Abbey, it is 40 ft. high, the diameter of the trunk 3 ft., and of the head 80 ft.; at Ampthill, in Gibbs's Nursery, on deep sandy soil, it is 70 ft. high, diameter of the head 60 ft. In Buckinghamshire, at Temple House, 40 years old, it is 30 ft. high. In Cheshire, at Kinmel Park, it is 45 ft. high, diameter of the trunk 3 ft., and of the head 35 ft. In Denbighshire, at Llanbede Hall, 50 years planted, it is 55 ft. high. In Gloucestershire, at Doddington, it is 50 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 59 ft. In Hertfordshire, at Cheshunt, 6 years planted, it is 18½ ft. high. In Leicestershire, at Donnington, 100 years old, it is 65 ft. high. In Oxfordshire, in the stable-yard of the president of St. John's College, Oxford, it is 50 ft. high, diameter of the trunk, at 1 ft. from the ground, and also at 10 ft. or 12 ft., in height, 4 ft. 4 in., and the diameter of the head 90 ft. In Pembrokeshire, at Stackpole Court, 55 years planted, it is 40 ft. high. In Radnorshire, at Maeslaugh Castle, it is 60 ft. high, diameter of the trunk 2 ft. 8 in., and of the head 71 ft. In Rutlandshire, at Belvoir Castle, 4 years planted, it is 20 ft. high. In Suffolk, at Finborough Hall, 100 years old, it is 90 ft. high, diameter of the trunk 4 ft. 10 in., and of the head 70 ft. In Worcestershire, at Hadzor House, 17 years planted, it is 32 ft. high. In Yorkshire, at Hackness, 40 years old, it is 35 ft. high.

Jùglans règia in the Environs of Edinburgh. At Hopetoun House, it is 40 ft. high, diameter of the trunk 2 ft., and of the head 42 ft.

Jùglans règia South of Edinburgh. In Ayrshire, at Rozelle, it is 38 ft. high; at Fullerton, it is 67 ft. high, diameter of the trunk 4 ft., and of the head 78 ft. In Berwickshire, at the Hirsel, 10 years planted, it is 18 ft. high. In Kirkcudbrightshire, at St. Mary's Isle, it is 48 ft. high, diameter of the trunk 2½ ft., and of the head 36 ft. In Haddingtonshire, at Tynningham, it is 46 ft. high, diameter of the trunk 2 ft. 3 in., and of the top 33 ft. In Renfrewshire, at Bothwell Castle, it is 57 ft. high, diameter of the trunk 4 ft., and of the head 90 ft.

Jùglans règia North of Edinburgh. In Aberdeenshire, at Thainston, 20 years planted, it is 15 ft. high. In Banffshire, at Gordon Castle, it is 66 ft. high, diameter of the trunk 3 ft. 2 in., and of the head 77 ft. In Clackmannanshire, in the garden of the Dollar Institution, 9 years planted, it is 16 ft. high. In Forfarshire, at Monboddo, 24 years planted, it is 15 ft. high. In Fifeshire, at Dunibristle Park, it is 60 ft. high, diameter of the trunk 3½ ft., and of the head 69 ft.; at Largo House, it is 40 ft. high, diameter of the trunk 1 ft. 8 in., and of the head 42 ft. In Forfarshire, at Courtachy Castle, 120 years old, diameter of the trunk 2 ft., and of the head 40 ft. In Perthshire, at Taymouth, 30 years planted, it is 70 ft. high. In Ross-shire, at Brahan Castle, 50 years old, it is 45 ft. high.

Jùglans règia in the Environs of Dublin. In the Glasnevin Botanic Garden, 33 years old, it is 30 ft. high; at Cypress Grove, it is 70 ft. high, diameter of the trunk 3 ft., and of the head 96 ft.; at Terenure, 20 years old, it 25 ft. high.

Jùglans règia South of Dublin. In King's County, at Charleville Forest, 45 years old, it is 50 ft. high, diameter of the trunk 3 ft. 8 in., and of the head 50 ft.

Jùglans règia North of Dublin. In Fermanagh, at Florence Court, 50 years planted, it is 40 ft. high, diameter of the trunk 2½ ft., and that of the top 36 ft. In Galway, at Cool, 35 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 50 ft. In Sligo, at Makree Castle, it is 65 ft. high, diameter of the trunk 2 ft., and of the head 39 ft.

Jùglans règia in France. Near Paris, in the Jardin des Plantes, 60 years planted, it is 61 ft. high, the diameter of the trunk 2 ft. At Nantes, in the Nursery of M. De Nerrières, 80 years old, it is 79 ft. high, with a trunk 2 ft. in diameter.

Jùglans règia in Germany. In Austria, at Vienna, in the University Botanic Garden, 45 years planted, it is 36 ft. high, the diameter of the trunk 8 in., and of the head 15 ft.; at Kopenzel, 30 years planted, it is 25 ft. high, the diameter of the trunk 10 in., and of the head 16 ft.; at Hadersdorf, in the garden of Baron Loudon, 40 years planted, it is 30 ft. high, the diameter of the trunk 8 in., and of the head 12 ft.

Jùglans règia in Russia. It is remarkable that this tree is so much injured by the climate of Odessa, as not to be considered by M. Descemet as acclimatised there; though *J. nìgra* grows freely, and matures its fruit.

Jùglans règia in Italy. In Lombardy, at Monza, 80 years planted, it is 46 ft. high, the diameter of the trunk 2 ft., and of the head 60 ft.

Commercial Statistics. Price of plants, in the London nurseries, seedlings, 5*s*. per hundred; transplanted plants, from 2 ft. to 5 ft. high, 25*s*. per hundred; from 6 ft. to 8 ft. high, 1*s*. each; from 10 ft. to 20 ft. high, 2*s*. 6*d*. each. Nuts, 8*s*. per bushel. At Bollwyller, plants are 1 franc each; at New York, 40 dollars per hundred, or 50 cents each.

¥ 2. *J.* NI'GRA *L.* The black-*wooded* Walnut Tree.

Identification. Lin. Hort. Cliff., p. 449.; Willd. Sp. Pl., 4. p. 456.; Michx. Arb., 1. p. 157. t. 1; Michx. North Amer. Sylva, 1. p. 153. t. 30.; Pursh Fl. Amer. Sept., 2. p. 636.; Mill. Dict., No. 2.; Lodd. Cat. ed. 1836.

Synonymes. The black Walnut, the black Hickory Nut, *N. Amer.*; Noyer noir, *Fr.*

Engravings. Michx. Arb., 1. t. 1.; Michx. North Amer. Sylva, t. 30.; Jacq. Ic. Rar. 1. t. 191.; Wangh.

Amer., t. 8. f. 20; Catesb. Car., 1. t. 67.; Wats. Dend. Brit., t. 158; our *fig.* 1260., and the plate of this tree in our last Volume.

Spec. Char., &c. Leaflets, in a leaf, 13—17; cordate-acuminate, unequal at the base, serrated, somewhat downy; lateral ones upon short petiolules. Fruit globose, roughish with minute prominent points, situated upon a short inflexible peduncle. Nut globose, somewhat compressed at the sides, ridged and furrowed. (*Michx. North Amer. Sylva*, i. p. 153.) A native of fertile soil in woods in North America, from New England to Florida. Introduced in 1656, and growing to the height of from 60 ft. to 100 ft.; flowering in April or May, and ripening its fruit in October.



1260

Description, &c. The black walnut, in the United States is often seen from 60 ft. to 70 ft. in height, with trunks of from 3 ft. to 4 ft. in diameter; and occasionally much higher, with trunks of from 6 ft. to 7 ft. in diameter. According to Michaux, when it stands insulated, its branches extend themselves horizontally to a great distance, and spread into a spacious head, which gives the tree a very majestic appearance. The leaves are about 18 in. in length, composed of 6, 7, or 8 pairs of opposite leaflets, with an odd one. They are acuminate, serrated, and somewhat downy; and, when bruised, they emit a strong aromatic odour. The male catkins are simple, pendulous, and cylindrical; unlike those of the hickories, which are always compound. The fruit is round, odoriferous, and of rather an uneven surface: it is sometimes 7 in. or 8 in. in circumference when fully grown; and it always appears at the extremity of the branches. The husk is thick, and is not, as in the hickories, divided into sections; but, when ripe, it softens and gradually decays. The nut is hard, somewhat compressed at the sides, and furrowed. The kernel is divided by firm ligneous partitions. According to Michaux, it is of a sweet and agreeable taste; but Catesby says that it is very oily and rank; and, when fallen from the tree for some months, or gathered and laid by, is only eaten by squirrels or Indians. The wood is of a dark colour, approaching to black. In Kentucky, the nut is nearly as large as the European walnut; but in Genessee, where the climate is colder, it is not above half the size. Michaux says that the differences in the moulding of the fruit are so various, as to induce Europeans to consider the variations, in this respect, as indicating distinct species. In England, the tree attains as great a height as in North America, but the fruit is not quite so large. In the garden at the palace at Fulham, abundance of fruit is produced every year; and the nuts are sent to table, but scarcely considered eatable. The growth of the tree is remarkably quick, more so than that of the European walnut: the leaves come out, in Pennsylvania, in the second week of May; and, in England, about the beginning of June, before those of the common walnut. At 8 or 10 years of age, *J. nigra* begins to bear, and age increases its fertility. No tree will grow under its shade, and even grass is injured by it. In 40 years it will attain the height of from 50 ft. to 60 ft.

Geography. This tree is found in all parts of the United States, as far

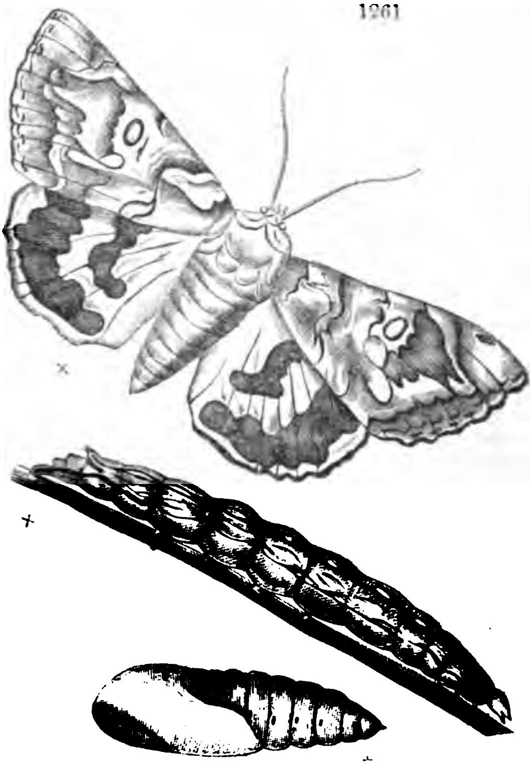
north as lat. 40° 50′. It is abundant in the forests about Philadelphia; and, with the exception of the lower parts of the southern states, where the soil is too sandy, or in the swamps, where it is too wet, it is met with from Goshen to the banks of the Mississippi, throughout an extent of 2000 miles. It grows in the forests with Gymnócladus canadénsis, Gledítschia triacánthos, Robínia Pseùd-*A*càcia, *M*òrus rùbra, *C*àrya álba, *A*'cer sacchárinum, *U*'lmus rùbra, and *C*éltis crassifòlia. It is always found in good deep soil.

History. The black walnut seems to have been one of the first trees that were introduced from America into Europe; having been cultivated by Tradescant, jun., about the middle of the seventeenth century. As it ripens its nuts in this country and in France, it has been very generally introduced in artificial plantations; and it thrives as far north as Sweden, though it will not bear fruit there. In America, Jacquin informs us, it is much planted near houses for its shade, and also for its fruit; being there, as here, considered hardier than the common walnut.

Properties and Uses. The heart-wood remains sound for a long period, when exposed to heat and moisture; but the sap-wood speedily decays. When properly seasoned, the wood is strong, tough, and not liable to warp or split. It is never attacked by worms, and has a grain sufficiently fine and compact to admit of a beautiful polish. It is made into cabinet-work, used in building houses, and also split into shingles 18 in. long, and from 4 in. to 6 in. wide, which are employed instead of tiles or slates for covering houses. Its most appropriate use, however, is for furniture, which, when made from pieces selected from the upper part of the trunk, close below the first ramification, is marked by highly beautiful curlings of the grain; though for cabinet purposes it is inferior to the wood of the wild cherry. It is employed for the stocks of military muskets in America, as the wood of the common walnut is for those of Europe; but for fowling-pieces, the wood of the red maple is preferred, as being lighter. Posts made of the black walnut have been known to last in the ground undecayed for from 20 to 25 years. It makes excellent naves for wheels; and, in Philadelphia, coffins are universally made of it. It is well adapted for naval architecture, being more durable, though more brittle, than the wood of the white oak; and not liable, like that wood, to be attacked by sea worms in warm latitudes. On the river Wabash, canoes are made of it, some of them 40 ft. long, and 2 ft. or 3 ft. wide, hollowed out of a single trunk, which are greatly esteemed for their strength and durability. The wood is frequently exported to Europe, in planks of 2 in. in thickness, where it is used for cabinet purposes. As compared with the wood of the European walnut, which it more nearly resembles than it does any other of the American species, it is heavier, much stronger, susceptible of a finer polish, and not so liable to be injured by worms. The husk of the fruit is used, in America, for dyeing woollen stuffs yellow. In Europe, Michaux thinks that this tree might be advantageously employed along high roads, to succeed the elm; for experience has proved, he observes, that, to insure success in the continued cultivation of either ligneous or herbaceous plants in the same soil, species of different natural orders must be made to succeed one another.

Propagation and Culture. In Europe and in America, the tree is universally raised from the nut, which, after being imported, ought to be sown immediately, as it seldom retains its vital power more than six months after it has ripened. Nuts of *J*ùglans règia and *J*. nìgra have been planted at the same time, and in the same soil; and the latter have been observed to grow more vigorously, and to attain a given height in a shorter time, than the former Michaux suggests that, by grafting the European upon the American walnut, at the height of 8 ft. or 10 ft., their respective advantages in quality of wood and fruit might be united; but we have not heard of this having been done. In Europe, as we have already observed, the black walnut is almost universally raised from the nut; and, if the nut is planted where the tree is finally to remain, it will grow up with greater vigour, and not be retarded by that

1261



check which is always given to taprooted trees by transplanting. Nuts are best imported from America packed in moist loam, or in moist moss; and, if they should germinate before their arrival, they will suffer little injury if planted immediately.

Insects. The principal insect that attacks the black walnut in America is the *Phalæ'na neógama*, or great yellow underwing moth. (*fig.* 1261.) The larva is of a dark brown, so nearly of the colour of the bark, against which it stretches itself when it has done feeding, as hardly to be distinguished from it. The perfect insect is very beautiful; its wings being of a bright yellow, and bright brown. (*Abb. and Smith*, t. 88.)

Statistics. Jùglans nigra in the Environs of London. At Fulham Palace, 150 years old, it is 50 ft. high; diameter of the trunk 5 ft., and of the head 50 ft. (See p. 43.) At Syon, 79 ft. high; diameter of the trunk 2 ft. 11 in., and of the head 59 ft. The trunk of a walnut tree, grown on the south side of Lake Erie, in North America, was exhibited in London in 1827. It was 12 ft. in diameter, hollowed out, and furnished as a sitting room. The tree was said to have been 150 ft. high, with branches from 2 ft. to 4 ft. in diameter. The bark was 1 ft. thick.

Jùglans nigra South of London. In Hampshire, at Testwood, 70 years old, it is 52 ft. high; diameter of the trunk 2 ft., and of the head 150 ft. In Wiltshire, at Bowood, 35 years planted, it is 48 ft. high; diameter of the trunk 1 ft. 4 in., and of the head 36 ft.

Jùglans nigra North of London. In Lancashire, at Latham House, 40 years planted, it is 32 ft. high; diameter of the trunk 1 ft. 2 in., and of the head 24 ft. In Shropshire, at Kinlet, it is 33 ft. high; diameter of the trunk 13 in., and of the head 29 ft.

Jùglans nigra in Scotland. In Cromarty, at Tulloch Castle, it is 60 ft. high; diameter of the trunk 3 ft., and of the head 42 ft. In Fifeshire, at Donibristle Park, 14 years planted, it is 35 ft. high; diameter of the trunk 13 in., and of the head 24 ft.

Jùglans nigra in Ireland. Near Dublin, at Terenure, 15 years old, it is 18 ft. high. In Limerick, at Adare, is a tree with a trunk 2 ft. in diameter.

Jùglans nigra in France. At Toulon, in the Botanic Garden, 50 years old, it is 60 ft. high, diameter of the trunk 1 ft. 5 in; at Colombe, near Metz, 60 years old, it is 20 ft. high, diameter of the trunk 1 ft. 6 in., and of the head 50 ft.; at Avranches, in the Botanic Garden, 29 years old, it is 29 ft. high, diameter of the trunk 1 ft., and of the head 19 ft.

Jùglans nigra in Germany. At Göttingen, in the Botanic Garden, 40 years planted, it is 70 ft. high, with a trunk 1 ft. 6 in. in diameter. In Cassel, at Wilhelmshöe, 60 years old, it is 12 ft. high, with a trunk 1 ft. 6 in. in diameter. In Bavaria, in the Botanic Garden, Munich, 24 years planted, it is 20 ft. high. In Austria, near Vienna, at Kopenzel, 25 years planted, it is 16 ft. high; in Rosenthal's Nursery, 20 years planted, it is 30 ft. high; at Hadersdorf, in the garden of Baron Loudon, 40 years planted, it is 20 ft. high, the diameter of the trunk 14 in., and of the head 16 ft.; at Brück on the Leytha, 45 years planted, it is 56 ft. high. At Berlin, in the Botanic Garden, 40 years planted, it is 60 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 36 ft.

Jùglans nigra in Italy. In Lombardy, at Monza, 24 years planted, it is 40 ft. high, the diameter of the trunk 1 ft., and of the head 16 ft.; at Desio, near Milan, it is 62 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 40 ft.

Commercial Statistics. Plants, in the London nurseries, are 1*s.* 6*d.* each, and nuts 9*d.* per quart; at Bollwyller, 1 franc 50 cents; and at New York, 37½ cents.

† 3. *J.* CINE`REA *L.* The grey-*branched* Walnut Tree, *or Butter-nut.*

Identification. Lin. Sp. Pl., 1415.; Willd. Sp. Pl., 4. p. 456.; Pursh Fl. Amer. Sept., 2. p. 636.; Lodd. Cat., ed. 1836.

Synonymes. J. cathártica *North Amer. Sylva*, 1. p. 160—165. t. 31., *Michx. Arb.*, 1. p 165.; J. oblónga *Mill. Dict.*, No. 3.; *Retz. Obs.*, 1. p. 10.; Oil-nut, White Walnut, *Amer.*; Noyer cendré, *Fr.*; graue Walnuss, *Ger.*

Engravings. Michx. Arb., 1. t. 2.; Michx. North Amer. Sylva, t. 31.; Jacq. Ic. Rar., 1. t. 192.; Wangh. Amer., t. 9. f. 21.; and our *fig.* 1262.

Spec. Char., &c. Petiole villous. Leaflets, in a leaf, 15—17; lanceolate, rounded at the base, serrate with shallow teeth; tomentose beneath; lateral ones sessile. Fruit oblong-ovate, with a tapered tip, downy, covered with viscid matter in small transparent "vesicles" [? glanded hairs], pendulous on a flexible peduncle. Nut oval, with an acuminate tip, very rough with prominent irregular ridges. (*Michx. N. Amer. Syl.*, and *Pursh.*) A native of North America, near the sea coast, from Canada to Virginia, and on the Alleghany Mountains; where it flowers in April and May, and ripens its fruit in October. Introduced in 1656.

Description, &c. The grey walnut, according to Michaux, is a tall tree, like Jùglans nìgra; of which, notwithstanding the very different form of the fruit, we cannot help thinking it is only a variety; because it is not very readily distinguished from that species by the wood or the leaves. We speak, however, only from what we have seen in young trees in the neighbourhood of London: and this seems to be the case with young trees in America; for Michaux observes that the two species, when young, resemble each other in their foliage, and in the rapidity of their growth; but that they are distinguishable at first sight, when arrived at maturity. The



1262

buds of the Jùglans cinèrea, like those of *J.* nìgra, are not covered by scales; and the leaves unfold a fortnight earlier than those of the genus Càrya, or hickories. The leaves are composed of seven or eight pairs of sessile leaflets, with an odd one. The leaflets are from 2 in. to 3 in in. length, serrated, and slightly downy. The male catkins are large, and cylindrical, 4 in. or 5 in. long, and attached to the shoots of the preceding year; differing, in this respect, from the male catkins of the Jùglans nìgra, which appear at the extremity of the branches of the current year. The fertile flowers come out on the extremity of the current year's shoots, and their stigmata are rose-coloured. The fruit is commonly single, and suspended by a thin pliable peduncle, about 3 in. in length: its form is oblong-oval, without any appearance of seam. It is often 2½ in. in length, and 5 in. in circumference; and is covered with a viscid adhesive substance, composed of small transparent vesicles, which are not readily discovered without the aid of a glass. The nuts are hard, oblong, rounded at the base, and terminated at the summit in an acute point; the surface is very rough, and deeply and irregularly furrowed. In America, in the neighbourhood of New York, the nuts are ripe about the middle of September, a fortnight earlier than those of the other species of walnut. The kernel is thick and oily, and soon becomes rancid; hence, doubtless, the names of butter-nut and oil-nut. In America, the tree produces the fruit in such abundance, that in some seasons a person may gather several bushels of

them in a day. It grows with equal rapidity, when young, as the *J.* nìgra; but the trunk ramifies at a less height; and, the branches extending more horizontally than those of most other trees, and spreading widely, a large and flat tufted head is formed, which gives the tree, in America, more especially in exposed situations, a most remarkable appearance. In Britain, we have scarcely seen any old trees; and, never having observed any fruit on the few of middle size which we have seen bearing this name, we have always been in doubt as to the specific difference between them and *J.* nìgra.

Geography. *Jùglans* cinèrea is found in Upper and Lower Canada, and in the temperate regions of the United States; but not in the lower parts of the Carolinas, of Georgia, and of East Florida. It grows vigorously in Vermont, where the winter is so rigorous, that sledges are used during four months of the year. Michaux has seen no trees of it so large as some in New Jersey, on the steep and elevated banks of the Hudson, nearly opposite to the city of New York. There the woods are thin, the soil cold, unproductive, and interspersed with large rocks. In the interstices of the latter, the butter-nut may be found 50 ft. high, with trunks measuring 10 ft. or 12 ft. in circumference at 5 ft. from the ground; the roots extending horizontally, close under the surface, and with little variation in point of thickness, to the distance of 40 ft. from the tree.

History. *J.* cinèrea appears to have been first sent to Europe in 1699, at which period it was cultivated by the Duchess of Beaufort; but whether in her garden at Chelsea, or in that at Badminton, we are not aware. It is said to have been grown by Miller; but, from his description of it, as having only two pairs of leaflets, we think it more likely that the plant he describes has been some other species under this name. At present, *J.* cinèrea is not unfrequent in British and French nurseries; and nuts are annually imported by the seedsmen; but we know of very few large trees.

Properties and Uses. The wood of *Jùglans* cinèrea is light, of a reddish colour, and of little strength; but it possesses, in common with the wood of all the species of the genera of this order, the great advantage of lasting long, and of being secure from the annoyance of worms. In America, it is never used in towns for the construction of houses; but in the country, in some districts, it is used for sleepers and sills in the framework of barns and other farm buildings. As it long resists the effects of heat and moisture, it is valued for posts and rails, and for watering and feeding-troughs for the use of cattle. Being lighter, and less liable to split, than the wood of the red maple, it is preferred to it for corn shovels and wooden dishes. Canoes and small skiffs are also made of it, and at Windsor, in Vermont, coach panels. The medicinal properties of the bark have been proved by several eminent American physicians. An extract, or a decoction, sweetened with honey, is a sure and safe purgative, unattended, even in the most delicate constitutions, with pain or irritation. The bark is also applied to cure the toothach, and to dye wool of a dark brown colour; though, for this last purpose, it is inferior to the bark of *J.* nìgra. If an incision is made in the trunk of the tree, in the month which precedes the unfolding of the leaves, a copious discharge of slightly sugary sap takes place, from which, by evaporation, an inferior sugar is obtained. On the whole, notwithstanding the various properties of this tree in the United States, Michaux does not think it sufficiently valuable, either in the arts or for fuel, to recommend its introduction into the forests of Europe. It should, he says, find a place only in our pleasure-grounds.

Statistics. In the environs of London are some trees bearing this name, in the Chelsea Botanic Garden, and at Syon and Purser's Cross, which are from 30 ft. to 40 ft. high; and in the Horticultural Society's Garden there is one which, in 1834, after being 10 years planted, was from 20 ft. to 25 ft. high. In Loddiges's arboretum, one is 18 ft. high. In France, at Toulon, in the Botanic Garden, 40 years planted, it is 60 ft. high; diameter of the trunk 1 ft. 6 in., and of the head 25 ft. In Saxony, at Wörlitz, 50 years old, it is 40 ft. high; the diameter of the trunk 2 ft. In Austria, at Vienna, in the park of Laxenburg, 16 years planted, it is 14 ft. high. At Brück on the Leytha, 45 years planted, it is 54 ft. high; the diameter of the trunk 1 ft. 9 in., and of the head 28 ft. In Prussia, at Berlin, in the Botanic Garden, 40 years planted, it is 16 ft. high; the diameter of the trunk 8 in. and of the head 6 ft.

GENUS II.

CA'RYA *Nuttall.* THE CARYA, *or HICKORY TREE.* *Lin. Syst.* Monœ'cia Tetr-Hex-ándria.

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 220.; Lindley Nat. Syst. of Bot., p. 180.
Synonymes. Júglans sp. *Lin.*, *Willd.*, *Michx.*; *Hicòrius* Rafinesque; Hickory, *Amer.*
Derivation. "*Karua* (Carya), the walnut tree: the name which the Greeks applied to *Júglans* règia." (*Nuttall, Gen. N. Amer. Pl.*, ii. p. 220.) The name of Càrya was applied to the common walnut by the Greeks, in honour of Carya, daughter of Dion, king of Laconia, who was changed by Bacchus into that tree. (See Sir Wm. Chambers's *Treatise on Civil Arch.*, vol. i. p. 55.) Diana had the surname of Caryata from the town of Carya, in Laconia, where her rites were always celebrated in the open air, under the shade of a walnut tree. (*Pausanias, Lac.*, c. 10.) Plutarch says the name of Càrya was applied to the walnut tree from the effect of the smell of its leaves on the head. (*Sym.*, lib. ii.)

Description, &c. In the general remarks on the walnuts and hickories quoted from Michaux, it was observed, that, while the hickories bore a great family resemblance to each other, yet that they differed considerably in the number and size of their leaflets, and in their fruit: but, notwithstanding this difference, an extraordinary uniformity of structure pervades the timber of the whole of the hickories. "So close an analogy exists in the wood of these trees, that, when stripped of their bark, no difference is discernible in the grain, which is coarse and open in all; nor in the colour of the heart-wood, which is uniformly reddish." (*Michx.*) The timber of all is of great weight, strength, and tenacity; but it decays speedily when exposed to heat and moisture, and is peculiarly liable to injury from worms. It is, consequently, never used in building houses or ships; but it is found admirably adapted for the axletrees of carriages, the handles of axes, and for large screws, particularly those of bookbinders' presses. It is also used for the backs of chairs, coach-whip handles, musket-stocks, rake teeth, flails for thrashing grain, the bows of yokes, and many similar purposes. The principal use of the hickory in the United States is, however, for forming hoops for casks; and it is the only American wood which is found perfectly fit for that purpose. "When it is considered how large a part of the productions of the United States is packed in barrels, an estimate may be formed of the necessary consumption of hoops," and, consequently, of the great demand that there must exist for hickory wood. In consequence of this great demand, hickory wood is becoming scarce; particularly as the shoots do not sprout a second time from the same root, and the growth of young plants is slow. In sloops and schooners, the wooden rings by which the sails are hoisted, and confined to the mast, are always of hickory. Nearly all the hickory timber is very heavy, and will produce an ardent heat while burning, and leave "a heavy, compact, and long-lived charcoal." It is consequently greatly esteemed for fuel. When propagated, the nuts should, if possible, be planted where the trees are intended to remain, as most of the species have very long taproots, which are nearly destitute of fibres. This remark, however, does not apply to *C.* amàra, which, like *Júglans* nìgra, has abundance of fibrous roots. The pig-nut (*C.* porcìna) and the mocker-nut (*C.* tomentòsa) are considered to afford the best timber; and the pacane-nut (*C.* olivæfórmis) decidedly the best fruit, though small. Michaux suggests the probability of improving it in size by grafting it on the common, or black, walnut. Nuts of most of the kinds may be had in London, at 9*d.* per quart; and plants of some sorts from 1*s.* 6*d.* to 2*s.* each.

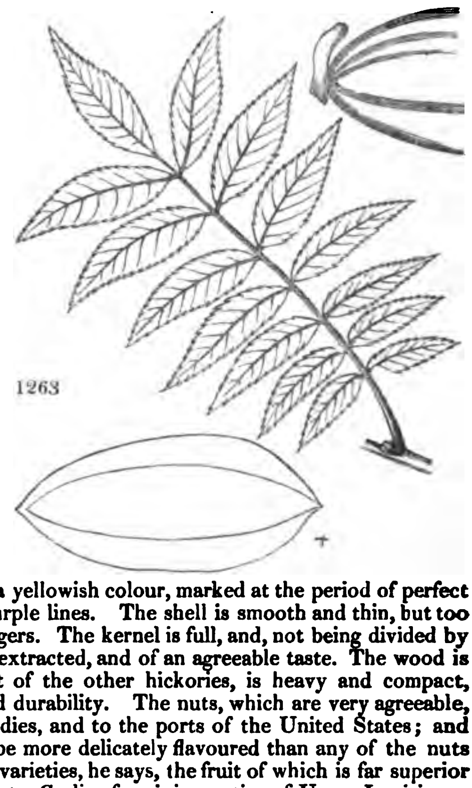
‡ 1. *C.* OLIVÆFO'RMIS *Nutt.* The olive-shaped Carya, *or Pacane-nut Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., p. 221.
Synonymes. Júglans rùbra *Gærtn. Sem.*, 2. p. 51., t. 89.; *J.* cylíndrica *Lam. Encycl.*, *N. Du Ham.*, 4. p. 179.; *J. Pècan* Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 3. p. 392.; *J.* angustifòlia *Ait. Hort. Kew.*; *J.* olivæfórmis *Michx. Fl. Bor. Amer.*, p. 192., *Willd. Sp. Pl.*, 4. p. 457., *Michx. North Amer. Sylva*, 1. p. 167., *Pursh Fl. Amer. Sept.*, 2. p. 636.; Pecan-nut, Illinois Nut, *Amer.*; Pécanier, Pacanus, Noyer Pécanier, *Fr.*

Engravings. Gærtn. Sem., 2. t. 89.; Michx. Arb., 1. t. 3.; North Amer. Sylva, 1. t. 32.; and our *fig.* 1263.

Spec. Char., &c. Leaflets, in a leaf, 13—15; ovate-lanceolate, serrate; lateral ones nearly sessile, and somewhat falcate. Fruit oblong, widest above the middle. Fruit and nut each with four angles in its transverse outline. Nut in form and ? size, compared with the fruit of the olive, narrowly elliptical. (*Michx. N. A. S.*) Native to North America, on the banks of the Ohio, Mississippi, and other rivers in Upper Louisiana; where it flowers in April and May. Introduced in 1766.

Description. In America, this species forms a beautiful tree, with a regular trunk, reaching to the height of 60 ft. or 70 ft. The buds, like those of *J.* nìgra and *J.* cinèrea, are smooth and uncovered. The leaves are from 12 in. to 18 in. in length; the petioles are somewhat angular; and the leaflets are sessile, and composed of 6 or 7 pairs, terminated by a petiolated odd one, which is somewhat smaller than the pair immediately preceding it. The leaflets, on flourishing trees, are from 2 in. to 3 in. long; ovate, serrated, and remarkable for the circular form of the upper edge, while the lower one is less rounded. The main rib is not exactly in the middle of the leaflet. The nuts, which are usually abundant, are contained in a husk from 1 line to 2 lines thick, and have 4 slightly prominent angles, which correspond to the divisions of the kernel. They vary in length from 1 in. to 1½ in.; are pointed at the extremities,



1263

of a cylindrical form, and of a yellowish colour, marked at the period of perfect maturity, with blackish or purple lines. The shell is smooth and thin, but too hard to be broken by the fingers. The kernel is full, and, not being divided by ligneous partitions, is easily extracted, and of an agreeable taste. The wood is coarse-grained, and, like that of the other hickories, is heavy and compact, possessing great strength and durability. The nuts, which are very agreeable, are exported to the West Indies, and to the ports of the United States; and Michaux considers them to be more delicately flavoured than any of the nuts of Europe. There are some varieties, he says, the fruit of which is far superior to that of the European walnut. *C.* olivæformis is a native of Upper Louisiana; and it abounds on the borders of the rivers Missouri, Illinois, St. Francis, Arkansas, and Wabash. On the Ohio, it is found for 200 miles from its junction with the Mississippi; higher than which it becomes rare, and is not seen beyond Louisville, nor beyond the mouth of the Great Mackakity, in lat. 42° 51″. It grows naturally in cold and wet soils. There is a swamp of 800 acres on the right bank of the Ohio, opposite to the river Cumberland, called by the French La Pacanière, which is said to be entirely covered with it. Dumont De Courset, in his *Botaniste Cultivateur* (vol. vi. p. 237.), says that his brother, who had served in the army of Washington in 1782, told him that "that celebrated general had always his pockets full of these nuts, and that he was continually eating them." There are trees in France, Michaux

observes in 1819, which have been planted more than thirty years, but which do not yield fruit. He recommends the grafting of this species on the common walnut. In the neighbourhood of London, there are trees in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges, upwards of 20 ft. high; and accounts have been sent us of some other trees of a greater size; but, though we have seen some of them at Purser's Cross and other places, we are so doubtful of their identity with the kind above described by Michaux, that we can assert nothing certain respecting them. There is a tree in the Jardin des Plantes, in Paris, which is 30 years planted, and 30 ft. high; diameter of the trunk 9 in., and of the head 22 ft.

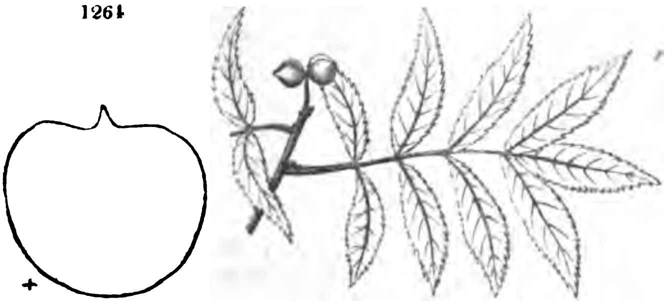
♀ 2. *C.* AMA`RA *Nutt.* The bitter-*nut* Carya, *or Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 222.
Synonymes. Jùglans amàra *Michx. Arb.*, 1. p. 170., *North Amer. Sylva*, 1. p. 170., *Pursh Fl. Amer. Sept.*, 2. p. 638.; Bitter nut, White Hickory, Swamp Hickory, *Amer.*
Engravings. Michx. North Amer. Sylva, 1. t. 33.; and our *fig.* 1264.

Spec. Char., &c. Leaflets, in a leaf, 7—9; ovate-oblong, acuminate, serrate with deep teeth, glabrous; lateral ones sessile. Sets of catkins in pairs. Fruit roundish-ovate, bearing, in its upper half, 4 wing-like ridges; husk thin and fleshy, softening and decaying, and never becoming ligneous, as in the other species. Nut subglobose, broader than long, tipped with a mucro. Seed bitter. (*Michx. N. A. S., Pursh Fl. A. S.*) A native of North America, in dry woods in fertile soil, from New England to Maryland, on the mountains; flowering in April. Introduced in 1800.

Description, &c. The bitter-nut hickory grows to a very large size in America; Michaux having measured trees in that country 70 ft. or 80 ft. high, with trunks from 3 ft. to 4 ft. in diameter. The leaves, which unfold a fortnight

1264



later than those of any other species, are from 12 in. to 15 in. in length, and nearly as much in breadth. Each leaf is composed of 3 or 4 pairs of leaflets, terminated by an odd one, which is larger than the rest. "The leaflets are about 6 in. in length, and 1 in. in breadth; sessile, oval-acuminate, deeply toothed, smooth, and of a pretty dark green. When the tree has shed its leaves, it may still be distinguished by its yellow and naked buds." (*Michx. N. Amer. Syl.*, i. p. 171.) The peduncles of the barren flowers are in pairs, each supporting three flexible and pendulous catkins, which are attached to the base of the shoots of the same season; at the extremities of which are the female flowers, which are inconspicuous. The fruit is very small, and produced in great abundance. The husk, which is thin, fleshy, and surmounted on its upper half by 4 appendages in the form of wings, never becomes ligneous, like those of the other hickories, but softens and decays. The shell is smooth, white, and thin enough to be broken with the fingers; the kernel is remarkable for the deep inequalities produced on every side by its foldings. It is so harsh and bitter, that squirrels and other animals will not feed upon it while any other nut is to be found. (*Michx.*) The bitter-nut hickory is a native of New Jersey and the Illinois, where it grows only in spots where the

soil is excellent, cool, and frequently inundated by creeks and rivers. "It is probably because it thrives most in such situations, that it is called the swamp hickory." (*Id.*) In some parts of Pennsylvania, an oil is made from the nuts. The wood resembles that of the other species of hickory; but it is very inferior to them. There is a tree of this species at Croome, in Worcestershire, which has been 30 years planted, and is 40 ft. high.

♆ 3. *C.* AQUA'TICA *Nutt.* The aquatic Carya, *or Water Bitter-nut Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 222.
Synonyme. Júglans aquática *Michx. Arb.*, 1. p. 182., *North Amer. Sylva*, 1. p. 174., *Pursh Fl. Amer. Sept.*, 2. p. 638.
Engravings. Michx. North Amer. Sylva, t. 34.; and our *figs.* 1265. and 1266.

Spec. Char., &c. Leaflets, in a leaf, 9—11; narrowly lanceolate, serrate. Very similar to the leaves of the peach tree (*Pérsica* vulgàris *Mil.*); the lateral ones sessile. Fruit peduncled, ovate, with 4 rather prominent ridges at the seams of the husk. Nut broadly oval, angular, a little depressed at the sides, roughish, reddish. (*Michx. N. A. S., Pursh Fl. Am. S.*) A native of North America, in swamps and rice fields, from South Carolina to Georgia; flowering in April. Introduced in 1800.

Description, &c. The water bitter-nut hickory is a tree of 40 ft. or 50 ft. high, with rather slender branches. "Its leaves are 8 in. or 9 in. long, and of a beautiful green: they are composed of 4 or 5 pairs of sessile leaflets, sur-

1265





1266

mounted by a petiolated odd one." (*Michx.*) The leaflets are serrated, long in proportion to their breadth, and very similar to the leaves of a peach tree. The husk is thin; and the nuts are small, somewhat rough, of a reddish colour, and very tender. The kernel is in folds, and too bitter to be eatable. This species is found in the southern states, in swamps, and in the ditches which surround rice fields; it appearing to require a great deal of warmth and moisture. The wood is light, weak, and very far inferior to every other kind of hickory. There are plants in the arboretum of Messrs. Loddiges; and a tree at Milford, near Godalming, between 40 ft. and 50 ft. high.

♆ 4. *C.* TOMENTO'SA *Nutt.* The tomentose Carya, *or Mocker-nut Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 221.
Synonymes. Júglans álba *Lin. Sp. Pl.*, 1415., according to *Willd. Sp. Pl.*, in Pursh's *Flora*, this is referred to *J.* álba *Michx. Fl. Bor. Amer.*, *C.* álba *Nutt.*; *J.* álba *Mill. Dict.*, No. 4., *Du Roi Harbk.*, 1. p. 333., *Kalm* in *Act. Holm.*, 1769, p. 117., *Wangh. Amer.*, 23., *Willd. Sp. Pl.*, 4. p. 457.; *J.* tomentósa *Michx. Fl. Bor. Amer.*, 2. p. 192., *Arb.*, 1. p. 186., *North Amer. Sylva*, 1. p. 176., *Pursh Fl. Amer. Sept.*, 2. p. 637.; White-heart Hickory, common Hickory, *Amer.*; Noyer dur, *Illinois*.
Engravings. Wangh. Amer., 2, 3. t. 10. f. 22.; Michx. Arb., 1. t. 6.; North Amer. Sylva, 1. t. 35.; and our *fig.* 1267.

Spec. Char., &c. Petiole downy beneath. Leaflets, in a leaf, 7—9; obovate-lanceolate, serrate with shallow teeth; downy and rough beneath; lateral ones sessile. Catkin very tomentose. Fruit, on some trees, globose, with depressions in the husk at the sutures; on other trees, oblong, with angles

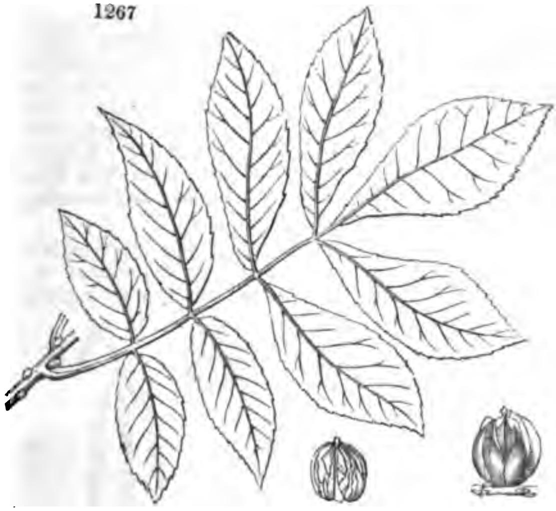
at the sutures. Nut with 4—6 angles in its transverse outline, having a short capitate beak at the tip. Shell somewhat channeled. (*Michx. N. A. S.*, *Pursh Fl. A. S.*) A native of North America, in forests where the soil is fertile, from New England to Virginia, and on the Alleghany Mountains. (*Pursh.*) Introduced in ? 1766.

Variety.

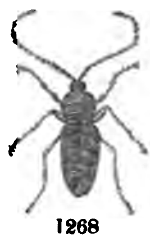
✝ C. *t.* 2 *máxima* Nutt., Sweet's Hort. Brit., ed. 1830.—Leaflets 7 in a leaf, ovate-lanceolate, acuminate, serrulate; beneath, softly pubescent, and of a paler colour; terminal leaflet subpetiolate. Fruit partly globose, of nearly twice the size ordinary in the species; as large as an apple. Husk exceedingly thick. Nut quadrangular, very large, having a thick shell, and a mucro that is prominent, quadrangular, and truncate at the tip. The kind grows a few miles from Philadelphia. (*Nutt. Gen. N. Amer. Pl.*, ii. p. 221.)

Description, &c. The mocker-nut hickory, Michaux informs us, is a tree about 60 ft. in height, and 18 in. or 20 in. in diameter. The buds of this species are large, short, of a greyish white, and very hard. In winter, they afford a characteristic by which the tree is easily distinguishable from all others of the same genus. In the beginning of May, the buds swell, the external scales fall off, and the inner ones burst soon after, and display the young leaf. The leaves grow so rapidly, that Michaux has seen them gain 20 inches in 18 days. "They are composed of 4 pairs of sessile leaflets, terminated by an odd one. The leaflets are large, ovate-acuminate, serrate, pretty thick, and hairy underneath, as is the common petiole to which they are attached. With the first frosts, the leaves change to a beautiful yellow, and fall off soon after. The barren flowers appear on pendulous, downy, axillary catkins, 6 in. or 8 in. long; the fertile flowers, which are not very conspicuous, are of a pale rose colour, and are situated at the extremity of the young shoots." (*N. Amer. Syl.*, i. p. 178.) The fruit is ripe in November, and varies very much in size and shape. The shell is very thick, and extremely hard; and the kernel, which is sweet, though small, is so difficult to extract, because of the strong partitions which divide it, as to have given rise to the name of mocker nut. The trunk of the old trees is covered with a thick, hard, rugged bark; and the wood is remarkable for its strength, tenacity, and durability. The heart-wood of the young trees is white; and hence the name of white-heart hickory, by which this tree is known in some parts of America. This tree is found principally in the forests which remain on the coast of the middle states; but it is rarely found in the Carolinas or Georgia, or north of Portsmouth, in New Hampshire. It is the only hickory which springs in the pine barrens. In these extensive tracts, the mocker-nut hickory and the

1267



black jack oak (Quércus nigra var. ferrugínea) are the only trees to be seen. They survive the conflagrations which almost every year envelope the prairies; but their vegetation is checked by the fire, and they rarely exceed the height of 8 ft. or 10 ft. (*N. Amer. Syl.*, i. p. 177.) Of all the hickories, this species is of the slowest growth; a fact, Michaux adds, that he has proved, by planting nuts of the several species together, and comparing the length of their annual shoots. It is, also, more liable to be attacked by worms than any other kind of hickory; especially by the larva of Callídium flexuòsum (*fig.* 1268.), which eats into the body of the tree.



1268

♀ 5. *C.* A'LBA *Nutt.* The white-*nutted* Carya, *or Shell-bark Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 221.
Synonymes. Jùglans álba *Michx. Fl. Bor. Amer.*, 2. p. 193., *Pursh Fl. Amer. Sept.*, 2. p. 458., and *Lin. Sp. Pl.*, 1415., on Pursh's citation; *J.* álba ovàta *Marsh. Arb.*, 115.; *J.* squamòsa *Michx. Arb.*, 1. p. 190., *North Amer. Sylva*, 1. p. 181.; *J.* compréssa *Gærtn. Sem.*, 2. p. 51., *Mühlenb.* in *Nov. Act. Soc. Nat. Scrut. Berol.*, 3. p. 390., *Willd. Sp. Pl.*, 4. p. 458.; Shag-bark Hickory, Scaly-bark Hickory, Kisky Thomas Nut, *Amer.*; Noyer tendre, *Illinois.*
Engravings. Gærtn. Sem. 2. t. 19.; Pluk. Alm., t. 309. f. 2.; Michx. Arb., 1. t. 7.; N. Amer. Sylva, 1. t. 36.; Wats. Dend. Brit., t. 148.; our *fig.* 1269.; and the plate of this tree in our last Vol.

Spec. Char., &c. Leaflets, in a leaf, 5—7; oblong-acuminate, argutely serrate; villous beneath; the pair nearest to the base of the petiole rather remote from it; terminal leaflet nearly sessile. Catkin glabrous. Fruit depressedly globose, with 4 longitudinal furrows, in the line of which the husk divides into 4 valves that become wholly separate. Nut compressed, oblique, 4-angled in its transverse outline, white. Bark exfoliating in long narrow strips. (*Michx. N. A. S., Pursh Fl. A. S.*) A native of North America, in forests where the soil is fertile, from New England to Carolina, and throughout the Alleghany Mountains; and flowering, in America, in April and May. Introduced in 1629.

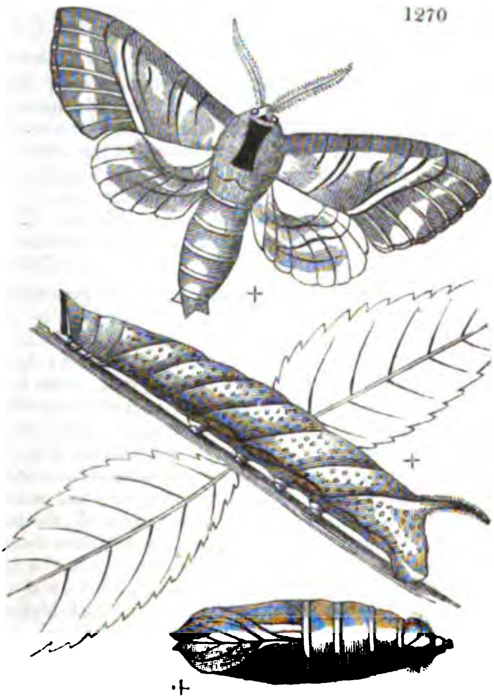
Description, &c. This species, Michaux observes, is named shell-bark, shag-bark, or scaly-bark, from the striking appearance of its outer bark, which peels off in long narrow plates, that curl up at their extremities, and only adhere in the middle. Of all the hickories, this species grows to the greatest height, with proportionately the smallest diameter; being sometimes seen 80 ft. or 90 ft. high, with a trunk clear of branches, and not more than 2 ft. in diameter



1269

for three fourths of its length. The buds are formed of scales, closely applied upon one another; the two external ones adhering, though only half the length of the bud; which disposition of the scales is peculiar to *C.* álba and *C.* sulcàta, and seems to indicate, according to Michaux, the exfoliating character of the epidermis of the bark. When the sap begins to ascend in the spring, the outer scales fall, and the inner ones swell, and become covered with a yellow silky down. After a fortnight, the buds attain the length of 2 in., and the young leaves are protruded. The growth of the leaves is so rapid, that in a month they attain their full length, which, in vigorous trees, is sometimes above 20 in. They consist of 2 pairs of leaflets, with a sessile odd one. The leaflets are very large, oval-acuminate, serrated, and slightly downy underneath. The barren flowers, which, in the state of New York, appear from the 15th to the 20th of May, are disposed on long, glabrous, filiform, pendulous

catkins, of which three are united on a common petiole, attached at the basis of the young shoots. The fertile flowers are of a greenish hue, small, and situated at the extremity of the shoots. The fruit is ripe about the beginning of October; and in some years it is so abundant, that several bushels may be gathered from a single tree. It is round, with four depressed seams, and averages, in general, 5¼ in. in circumference. The husk separates entirely from the nut; and its thickness is so disproportioned to the size of the nut, as to form a character peculiar to this species and *C.* sulcàta. The nuts are white (whence the name of *C.* álba), compressed at the sides, and marked by four distinct angles, which correspond to the divisions of the husk. The kernel is fuller and sweeter than that of any other American walnut or hickory, except that of *C.* olivæfórmis; but it is inferior to the fruit of the European walnut. Though the shell is thin, it is hard, and cannot, like that of the European walnut, be crushed with the fingers. The nuts are in considerable request, both for consumption in the United States and for exportation. The Indians lay up a store of these nuts for winter, a part of which they pound in wooden mortars; and, boiling the paste in water, they collect the oil which swims upon the surface, and use it as a seasoning to their food. The tree abounds on the shores of Lake Erie, about Geneva in Genessee, in the neighbourhood of Goshen in New Jersey, and on the banks of rivers in Pennsylvania. It does not extend farther north than Portsmouth and New Hampshire; nor farther south than Goose Creek, in South Carolina. It is found in company with the swamp white oak (*Quércus Prìnus* díscolor), the red maple (*A'cer* rùbrum), the sweet gum (Liquidámbar Styracíflua), the button-wood (*Plátanus* occidentàlis), and the tupelo (*Nýssa* bícolor). The wood, like that of *C.* sulcàta, is strong, elastic, and tenacious, but has the defects common to all the hickories; viz. those of soon decaying, and of being eaten up by worms. It is seldom used in construction, either in civil or naval architecture; but, because it splits very easily, and is very elastic, it is used for making whip handles and baskets. The whip handles are esteemed for their suppleness, and considerable quantities of them are annually exported to England. In the neighbourhood of New York and Philadelphia, it is much used for the back bows of Windsor chairs. Michaux recommends the introduction of the tree into European forests, where it should be planted in cool and humid places, analogous to those of its native habitats. In the north of Europe, he says, it could not fail of succeeding, as it securely braves the severest cold. He mentions a variety which he saw upon a farm in Seacocus, near Snake Hill, New Jersey, with fruit


1270

nearly twice as large as that of the species; and having a white shell, with rounded prominences instead of angles. A century of cultivation, he says, would perhaps not advance the species generally to an equal degree of perfection with this accidental variety. *Fig.* 1270. represents the *Sphínx juglándis*, or Hickory Hawk Moth, which in Georgia is found on this tree. The caterpillar is smaller than that of most of the other species, and generally is of a shaded red and yellow, though it is sometimes green. The perfect insects are brown, and resemble the English poplar hawk moth. The caterpillar buries in the ground, and varies very much as to the time in continues there: one observed by Abbott having gone into the ground in May, and reappeared in June; and another having buried itself in September, and remained in the ground till the following April. (*Abbott and Smith, Insects of Georgia.*)

Statistics. Near London, at Mount Grove, Hampstead, 80 years old, it is 58 ft. high, diameter of the trunk 1 ft. 11 in., and of the head 47 ft.; at Syon, it is 79 ft. high, diameter of the trunk 2 ft. 3 in., and of the head 46 ft.; at Fulham Palace, 40 years planted, it is 40 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 20 ft.; at Ham House, Essex, 65 ft. high, diameter of the trunk 1 ft. 10 in., and of the head 33 ft. In Sussex, at West Dean, 20 years planted, it is 36 ft. high. In Bedfordshire, at South Hill, it is 35 ft. high, diameter of the trunk 23 in., and of the head 30 ft. In Cambridgeshire, at Wimpole, 100 years old, with a trunk 3 ft. in diameter. In Durham, at Southend, 15 years planted, it is 30 ft. high. In Worcestershire, at Croome, 15 years planted, it is 30 ft. high. In Hertfordshire, at Cheshunt, 14 years old and 19 ft. high; diameter of the trunk 6 in., and that of the space covered by the branches 18 ft. In Nottinghamshire, at Nottingham, in Clumber Park, 52 ft. high, diameter of the trunk 2 ft., and of the top 53 ft. In Scotland, in Berwickshire, at the Hirsel, 6 years planted, it is 9 ft. high. In Messrs. Dickson and Turnbull's Nursery, Perth, 26 years old, it is 25 ft. high. In France, at Toulon, in the Botanic Garden, 50 years old, it is 70 ft. high; the diameter of the trunk 5 ft. 11 in. In Austria, at Vienna, in the University Botanic Garden, 45 years planted, it is 35 ft. high; the diameter of the trunk 1 ft. 3 in., and of the head 25 ft.

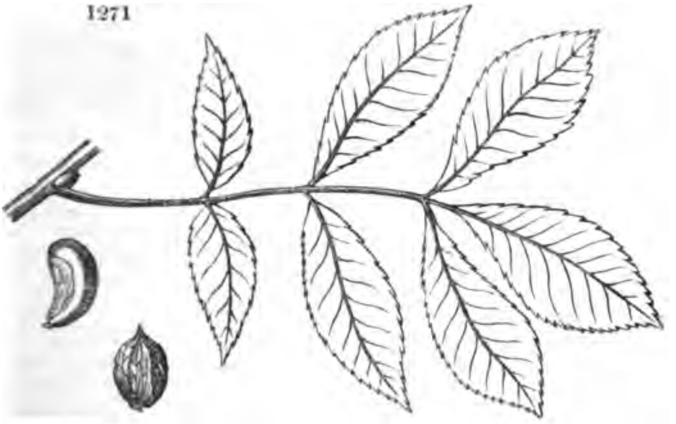
♀ 6. *C.* SULCA'TA *Nutt.* The furrowed-*fruited* Carya, *or Hickory*.

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 221.
Synonymes. Júglans laciniòsa *Michx. Arb.*, 1. p. 199., *North Amer. Sylva*, 1. p. 188.; *J.* mucronàta *Michx. Fl. Bor. Amer.*, 2. p. 192.; *J.* sulcàta *Willd. Arb.*, 154., t. 7., *Nov. Act. Soc. Nat. Scrut. Berol.*, 3. p. 391., *Willd. Sp. Pl.*, 4. p. 457. *Pursh Fl. Amer. Sept.*, 2. p. 637.; thick Shell-bark Hickory, Springfield Nut, Gloucester Nut, *Amer.*
Engravings. Willd. Arb., t. 7.; Michx. Arb., 1. t. 8.; North Amer. Sylva, t. 37.; and our *fig.* 1271.

Spec. Char., &c. Leaflets, in a leaf, 7—9; obovate-acuminate, argutely serrate; downy beneath. Fruit roundish, having 4 longitudinal ridges that extend from the tip to the middle, and 4 intervening depressions, or furrows. Husk dividing, from one extremity to the other, in the line of the furrows, into 4 equal valves. Nut subglobose, slightly compressed, having a long mucro at the tip, and a shorter stouter one at the base; yellowish. Bark exfoliating in long narrow strips. (*Michx. N. A. S., Pursh Fl. A. S.*) A native of North America, in fertile valleys in the Alleghany Mountains; and flowering in April and May. Introduced in 1804.

Description. Michaux says, speaking generally of the scaly-bark hickories, that "they exhibit many striking traits of resemblance which may warrant the grouping of them into a separate section. Besides their generic and specific characters, they possess others peculiar to themselves, by which they are so nearly related, that, were it not for some remarkable differences, they might be treated as a single species." *C.* sulcàta grows to the height of 80 ft., with an ample head, and a straight trunk. The bark is divided into strips, or shreds, from 1 ft. to 3 ft. long, the pieces of which, when they are ready to scale off, are warped outwards at each end, and attached only in the middle. When they fall, they are succeeded by others similarly exposed. In this species, Michaux observes, the plates of bark are narrower, more numerous, and of a lighter colour, than those of *C.* álba; from which differences he thought it advisable to give it the specific name of laciniòsa. The leaves vary in length from 8 in. to 20 in., and are composed of from 7 to 9 leaflets; whereas in *C.* álba, the shell-bark hickory, the leaflets are invariably 5. The barren catkins are long, glabrous, filiform, and pendulous; 3 being united on a common petiole, attached to the basis of the young shoots. The fertile flowers appear, not very conspicuously, at the extremity of the shoots of the same spring. They are succeeded by a large oval fruit, more than 2 in. long, and 4 in. or 5 in. in circumference. It has four depressed

1271



seams, which, at complete maturity, open throughout their whole length for the escape of the nut. The shell is thick, and of a yellowish hue; while that of the *C.* álba is white. The wood is of the same quality as that of *C.* álba: it is brought to market in Philadelphia, but only in very small quantities. The Gloucester hickory, Michaux considers to be a variety of this species; and he also mentions another, growing in the gardens of the Petit Trianon, and to which he thinks the specific name of ambígua might be given; as he is doubtful whether it is a variety or a species. In the Horticultural Society's Garden, and in the collection at Messrs. Loddiges's, and at White Knights, there are plants marked *Cárya* sulcàta, or *Júglans* laciniòsa, which are distinguishable from all the other species of *Cárya*, by their very large leaflets, which, in autumn, die off sooner than those of any of the other sorts. Nuts of this species are, in London, 1*s.* 6*d.* a quart.

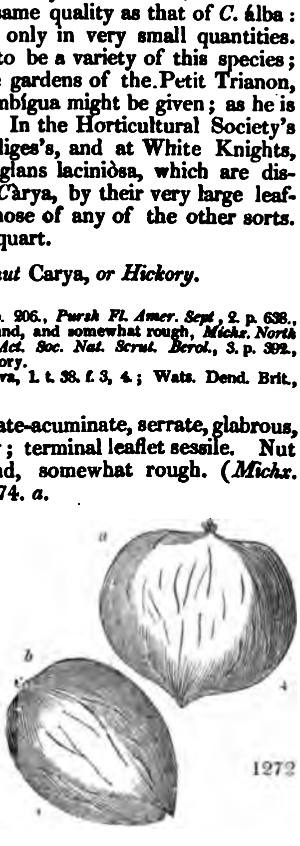
¥ 7. *C.* PORCI'NA *Nutt.* The Pig-*nut* Carya, *or Hickory*.

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 222.
Synonymes. Júglans porcina α obcordàta *Michx. Arb.*, 1. p. 206., *Pursh Fl. Amer. Sept.*, 2. p. 638., *Wats. Dend. Brit.*, t. 167.; *J.* porcina var. with fruit round, and somewhat rough, *Michx. North Amer. Sylva*, 1. p. 196.; *J.* obcordàta *Mühlenb.* in *Nov. Act. Soc. Nat. Scrut. Berol.*, 3. p. 392., *Willd. Sp. Pl.*, 4. p. 458.; Pig-nut, Hog-nut, Broom Hickory.
Engravings. Michx. Arb., 1. t. 9. f. 3, 4.; North Amer. Sylva, 1. t. 38. f. 3, 4.; Wats. Dend. Brit., t. 167.; and our *figs.* 1272, 1273, and 1274.

Spec. Char., &c. Leaflets, 5—7 in a leaf, ovate-acuminate, serrate, glabrous, dotted beneath with dots of resinous matter; terminal leaflet sessile. Nut obcordate. (*Willd. Sp. Pl.*) Fruit round, somewhat rough. (*Michx. N. A. S.*) See our *fig.* 1272. *a*, and *fig.* 1274. *a*.

Variety.

¥ 6. *C. p.* 2 *glàbra*; Júglans porcina β ficifórmis *Michx. Arb.*, i. p. 209., *Pursh Fl. Amer. Sept.*, ii. p. 638.; *J.* glàbra *Mühl.* in *Nov. Act. Soc. Nat.*, &c., iii. p. 391., *Willd. Sp. Pl.*, iv. p. 458.; and our *figs.* 1272. *b*, and 1274. *b*; has the husk of the fruit shaped like a small fig, instead of being round, like the species. Pursh observes of this variety, that the inhabitants from New England to Virginia make brooms of it, by slitting the very tough wood into narrow slips, which

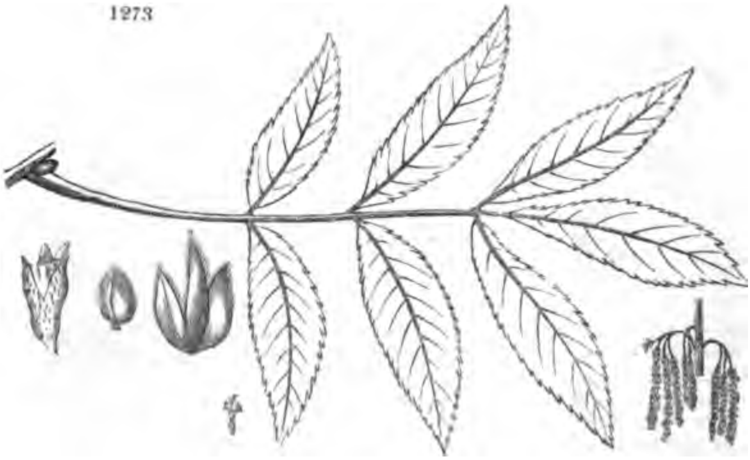


1272

finally form a very good and durable broom. The nuts, he adds, are very small, and extremely hard.

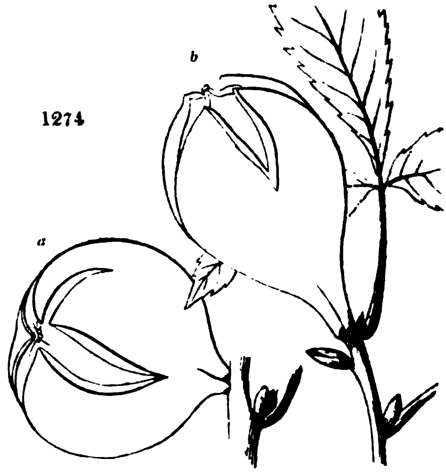
Description, &c. The pig-nut hickory is a lofty tree, 70 ft. or 80 ft. high, with a trunk from 3 ft. to 4 ft. in diameter. In winter, when stripped of its leaves, it is easily known by the shoots of the preceding summer, which are

1273



brown, less than half the size of those of *C.* álba and *C.* tomentòsa, and terminated by small oval buds. *C.* porcìna has scaly buds, which are more than 1 in. in length before they unfold. The inner scales, which are large and reddish, do not fall off till the leaves are 5 in. or 6 in. long. The leaves generally consist of three pairs of leaflets, and an odd one. The leaflets are 4 in. or 5 in. long, acuminated, serrated, nearly sessile, and glabrous on both sides. On vigorous trees which grow in shady exposures the petiole is of a violet colour. The catkins are about 2 in. long, smooth, flexible, and pendulous. The female flowers are greenish, and situated at the extremity of the shoots: the fruit which succeeds them is frequently produced in pairs. The husk is thin, of a beautiful green; and, when ripe, it opens through half its length for the passage of the nut, which is small, smooth, and very hard, on account of the thickness of the shell. The kernel is sweet, but meagre, and difficult to extract, from the firmness of the partition. These nuts, in America, are never carried to market, but serve for food for swine, racoons, and numerous squirrels which people the forests. (*Michx. N. Amer. Syl.*, i. p. 169.) This tree is found in the middle, western, and southern states, on the borders of swamps, and in places which are wet, without being marshy. It has been observed, that the mocker-nut is always

1274



found in company with the pig-nut; "but that the pig-nut does not always accompany the mocker-nut, which is satisfied with a much less substantial soil." The wood of this tree is stronger and better than that of any other kind of hickory; and, on account of its extreme tenacity, it is preferred to any of the other American woods for axletrees and axe-handles. For this reason, Michaux recommends its introduction into the forests of Europe, where its success, he says, would be certain. There are plants in the Hackney Arboretum.

♀ 8. *C.* MYRISTICÆFO'RMIS *Nutt.* The Nutmeg-like-*fruited* Carya, *or Nutmeg Hickory.*

Identification. Nutt. Gen. Amer. Pl., 2. p. 222.
Synonyme. Júglans myristicæfórmis *Michx. Arb.*, 1. p. 211., *North Amer. Sylva*, 1. p. 198., *Pursh Fl. Amer. Sept.*, 2. p. 638.
Engravings. Michx. Arb., 1. t. 10.; North Amer. Sylva, t. 38.; and our *fig.* 1275.

Spec. Char., &c. Leaflets, in a leaf, 9; ovate-acuminate, serrate, glabrous; the terminal one nearly sessile. Fruit ovate, roughish. Nut oval, with a small point at each end, even, brown with longitudinal lines of white; in which it resembles a nutmeg, which is the seed of Myristica moschàta; and hence the epithet myristicæfórmis. A native of South Carolina. (*Michx. N. A. S.*, *Pursh Fl. Am. Sept.*)

Description, &c. Very little is known of this tree. Michaux described only from a branch and a handful of nuts, which were given to him by a gardener at Charleston. The leaves consist of four or six small leaflets, and an odd one; and the nuts, which are very small, smooth, and brown, streaked with white, strongly resemble a nutmeg; whence the name. The shell is so thick, that it constitutes two thirds of the nut, which is, in consequence, very hard, and has a minute kernel, which is inferior even to that of the pig-nut. Michaux had no means of ascertaining the value of the wood; but he found the shoots of the current year extremely tough and flexible. (*Syl.*, i. p. 199.) This sort is not yet introduced.



1275

♀ 9. *C.* MICROCA'RPA *Nutt.* The small-fruited Carya, *or Hickory.*

Identification. Nutt. Gen. N. Amer. Pl., 2. p. 221.

Spec. Char., &c. Leaflets, in a leaf, about 5; oblong-lanceolate, conspicuously acuminate, argutely serrulate, glabrous; glandular beneath; terminal one subpetiolate. Fruit subglobose. Husk thin. Nut partly quadrangular, small; its shell rather thin, its mucro obsolete and truncate. Indigenous to the banks of the Schuylkill, in the vicinity of Philadelphia. (*Nuttall.*) A large tree, with even bark. Fruit much like that of *C.* tomentòsa, and eatable; but very small, the nut not exceeding the size of a nutmeg. Catkins trifid, very long, glabrous, without involucre; scales 3-parted, their lateral segments ovate, the central one linear. Anthers pilose, mostly 4, sometimes 3, sometimes 5. Female flowers 2 or 3 together; common peduncle bracteolate. Segments of the calyx very long, and somewhat leafy. Stigma sessile, discoid, 4-lobed, somewhat rhomboidal. (*Nuttall.*) Not yet introduced.

♀ 10. *C.* INTEGRIFO'LIA *Spreng.* The entire-leaf(let)ed Carya, *or Hickory.*

Identification. Spreng. Syst. Veg., 3. p. 849.; Sweet Hort. Brit., ed. 1830.
Synonyme. *Hicòrius* integrifòlius *Rafinesque.*

Spec. Char., &c. Branchlets and petioles tomentose. Leaflets, in a leaf, about 11; lanceolate, acuminate, entire. Stamens 6—8 in a flower. Nut with 4 angles in its transverse outline. (*Sprengel.*) Not yet introduced.

App. i. *Other Kinds of* Càrya.

C. *ambígua*; Júglans ambígua *Michx. N. A. Syl.*, 190.; is a kind which Michaux found in the gardens of the Petit Trianon, where it had heen raised from American seeds. Its bark exfoliates in strips; its leaves resemble those of *C.* sulcàta; and its fruit that of *C.* álba, but is smaller. From this description, it appears to belong to the shell-bark hickories.

C. *pubéscens* Lk. En.. Sweet's Hort. Brit., ed. 1833, is a kind of which we know nothing.

C. *rígida*, *J.* rígida *Lodd. Cat.*, *ed.* 1836. The plants bearing this name in the Hackney Arboretum appear to be varieties of *C.* álba.

GENUS III.



PTEROCA'RYA *Kunth.* THE PTEROCARYA. *Lin. Syst.* Monœ'cia ? Polyándria.

Identification. Kunth in Annales des Sciences Naturelles, 2. p. 346.; Lindley Nat. Syst. of Bot., p. 180.
Synonyme. Júglans sp. *Lin.*

Derivation. *Pteron*, a wing; *karua*, the common walnut. The fruit has wings; and, except in these, resembles that of the walnut.

⚘ 1. P. CAUCA'SICA *Kunth*. The Caucasian Pterocarya.

Identification. Kunth in Annal. des Scien. Nat., 2. p. 346.
Synonymes. Júglans pterocárpa *Michx. Fl. Bor. Amer.*, 2. p. 192., *Bieb. Fl. Taur. Supp.* 33. p. 622., *Willd. Sp. Pl.*, 4. 455., *Spreng. Syst.*, 3. p. 865.; Rhús obscùrum *Bieb. Fl. Taur. Cauc.*, no. 606.; *J. fraxinifòlia Lamond MS.*, *N. Du Ham.*, 4 p. 182.; Fráxinus lævigàta *Hort Par.*
Engravings. Our *fig.* 1276. from a seedling plant, and the plate of this tree in our last Volume

Spec. Char., *&c.* Leaflets, in a leaf, about 19; ovate-oblong, acuminate, argutely serrate, glabrous; each with the lower or hinder side of its base attached to the petiole. (*Lamarck MS.*, and *Spreng. Syst. Veg.*, iii. p. 865.) The following description is translated from that written by Poiret, published in the *Encyclopédie Méthodique*:—"A tree, about 40 ft. high, with an ample and tufted head. Young branches brownish green, very smooth, glossy. Pith disposed in thin membranes, placed transversely, and at about a line distant from one another: *J.* règia has its pith arranged in a similar manner. Leaves alternate, very large, commonly having 19 leaflets each, which are oblong, denticulate with blunt teeth; have their upper surface very smooth, almost glossy, and of a beautiful rather dark green, their under surface paler; and are disposed almost alternately. Buds, when bursting, of a rusty or brownish red colour. One remarkable character, and which serves to distinguish the species clearly, is, that each of the leaflets has one side of its base shorter than the other, and one of them attached, at least while the leaf is young, to the petiole. It occurs, in many instances, that, when the leaf gets old, the attached part of the leaflet becomes distinct from the petiole; but it is always the case that one side of the base is longer than the other. The petiole is round and very tumid at the base, smooth, and of a beautiful clear green." This tree is a native of moist woods at the foot of Caucasus, where it was discovered by Steven, and described by him in the *Mém. Soc. Nat. Cur. Mos.*, iii. p. 247, and iv. p. 70.; as noticed by Bieberstein in the *Supplement* to his *Flora Taur. Cauc*, quoted above. It was introduced into England as *J. fraxinifòlia*, several years since, and there are specimens under that name in the Horticultural Society's Garden, and in the collection of Messrs. Loddiges, where they form broad bushy plants, not yet more than 8 ft. or 10 ft. high. At Croome, in Worcestershire, there is a tree, 15 years planted, which is 25 ft. high. This species appears to have been first brought into notice by the elder Michaux, who, on his return from Persia in 1782 (see p. 1411.), introduced into France a plant from the shores of the Caspian Sea; which, according to Bosc, was the first that had ever been seen in Europe, and which still exists at Versailles, flowering there every year. It is described as growing from 20 ft. to 30 ft. high; and, though affected by frost, is yet sufficiently hardy to be classed among ornamental trees of the third rank. It is readily propagated by layers. For small gardens, and diminutive arboretums, this tree may serve very well to exemplify the Juglandàceæ. Care should be taken to train it to a single stem, and not to plant it in soil so rich and moist as to prevent it from ripening its wood. Perhaps, also, something might be gained in point of hardiness by grafting it upon the common walnut, either on the collar of the stock, in order to form dwarf trees, or bushes; or standard high, in order to form trees that would from the first have clear straight stems, and as they would ripen their wood better, in consequence of growing slower than low trees or bushes, so they would perhaps show blossoms and ripen fruit. Some years ago, Messrs. Booth of the Floetbeck Nurseries reintroduced this species into Britain as a new tree (see *Gard. Mag.*, vol. xi. p. 207.), under the name of Pterocàrya caucásica, being not aware of its identity with Júglans fraxinifòlia. Plants, in London, are 2*s.* 6*d.* each; and at Bollwyller, 3 francs.



1276

CHAP. CIII.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER SALICA`CEÆ.

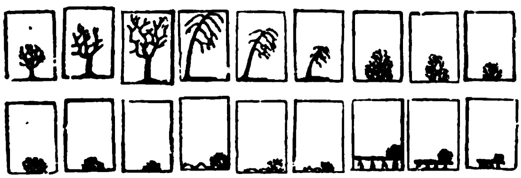
All the plants of this order are ligneous, and included in the genera *Sàlix L.* and *Pópulus L.*, which agree in having the flowers unisexual, and those of the two sexes situated upon distinct plants, disposed in catkins, and individually subtended in the catkins by a bractea, termed a scale by many botanical authors; in the seeds being contained in a capsule of one cell and two valves, and each seed bearing a tuft of longish white hairs; and in the leaves having stipules. The points of structure in which the genera differ will be found in the following characters; the essential distinction being in the number of stamens:—

Sa`lix L. Bractea to the flower of each sex entire. Male flower consisting of 1—5 stamens, more in a few species, and of one or more glands inserted contiguously to the stamens. Female flower consisting of a pistil that is stalked or sessile, or nearly sessile; and one or more glands inserted contiguously to it. Leaves, in most, with the disk more or less lanceolate. (*Smith Engl. Fl.*, and observation.)

Po'pulus L. Bractea to the flower of each sex laciniated in its terminal edge. Male flower consisting of a calyx, and 8 stamens at fewest; in many instances, many more. Female flower consisting of a calyx and a pistil. Leaves with the disk more or less oblate; and the petiole, in most, compressed in the part adjoining the disk. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ. Ill.*, and observation.)

Consistently with Dr. Lindley's definition of a catkin, given in his *Introduction to Botany*, ed. 2., what, in the genus *Sàlix*, has been usually termed the scale or the calyx, and by Borrer, in the *Supplement to English Botany*, the calyx scale, is here denominated a bractea; and what used to be called the nectary is, agreeably with Dr. Lindley's definition, in his *Synopsis of the British Flora*, here termed a gland.

Genus I.



*SA`LIX L.* The Willow. *Lin. Syst.* Diœ`cia Diándria.

Identification. Lin. Gen., 514.; Juss., 408.; Smith in Rees's Cyclo., vol. 31.; Fl. Br., 1039.; Tourn., t. 364.; Lam., t. 802.; Gærtn., t. 90.

Synonymes. Harab, *Hebrew*; Itea, *Gr.*; Sàlix, *Lat.*; Saule, *Fr.*; Weide and Felber, *Ger.*; salcio, *Ital.*; Sauze, *Span.*; Wide, *Swed.*; Wilge, *Flem.*; Withig, *Anglo-Sax.*; Willow, Withy, Sallow, Osier, *Engl.*; Saugh, *Scotch*.

Derivation. From *sal*, near, and *lis*, water, *Celtic*; in reference to its general habitat. According to others, from *salire*, to leap; on account of the extraordinary rapidity of its growth.

Description, &c. Trees and shrubs, mostly the latter, varying from 2 in. or 3 in., to 50 ft., 60 ft., and even to 80 ft. or 90 ft. in height. The branches are round and flexible. Leaves simple, undivided, stalked, generally alternate, deciduous. Stipules in pairs at the base of the footstalks, very variable in size, deciduous. The leaves are arranged spirally on the branches; those on which 3 complete the spiral have the epithet trípla applied to them; those which have 4, tétrapla, &c. In a very few species only are the leaves placed opposite, and not in a spiral order. In by far the greater number they are disposed in a hexaplous order. (*Walker.*) Catkins early, erect or drooping,

either from the same buds as the leaves, or, more commonly, from different ones. Their florets are almost invariably separated, being all barren on one plant, and fertile on another of the same species. The growth of the dwarfest species, such as *S.* herbàcea, is slow, and, in its native habitat, not above 1 in. a year, and often not so much; that of the larger shrubs, in their native habitats, varies from 5 in. or 6 in. to as many feet, especially when the plants are young, or newly cut down. The growth of some of the kinds cultivated for basket-making or hoops, in good soil, when cut down every year or every two years, is often from 8 ft. to 12 ft. in a single season. The growth of the tree kinds, more especially of *S.* álba and *S.* Russelli*àna*, is equally rapid when young; so that in ten years, in the climate of London, in suitable soil, and within reach of water, these kinds will attain the height of 50 ft. or 60 ft. The branches of most of the tree kinds have an upward direction, and have a flame-like motion in the wind, as in *S.* álba; but in others they are spreading, as in *S.* càprea; and, in one instance, drooping in a very decided manner, as in *S.* babylónica.

Anomalies in the Flowers. The flowers have been observed in various cases of anomaly, as to the manner in which they are disposed, or as to the constituent parts of themselves. A collection of cases and instances is here presented. Male flowers and female ones have been observed to occur in the same catkin in the following instances:— *S.* Hoppe*àna* Willd., as noticed in *Willd. Sp. Pl.*, in *Koch's Comm.*, and in *Smith's Engl. Fl.*; *S.* undulàta *Ehrh.*, or else *S.* No. 37. of *Treviranus's Obs. Bot.*; *S.* mirábilis *Host's Sal. Austr.*, i. t. 41.; and *S.* cinèrea, *S.* aurìta, and *S.* aquática, as noticed in *Engl. Fl.* Koch has noticed (*Comm.*) two instances under his *S.* cinèrea, which is more comprehensive than that of *Engl. Fl.*; *S.* càprea, as noticed by Koch, and taking the species as he views it; *S.* Humboldti*àna*, as noticed in *Koch Comm.*; *S.* tenuiflòra, as noticed in *Host's Fl. Austr.*, ii. p. 633.; and *S.* Forby*àna*, as noticed in *Engl. Fl.* The following cases are similar to the above, but some of the flowers are in a monstrous state:— *S.* cinèrea, as noticed in *Engl. Fl.*; *S.* aquática, as noticed in *Rees's Cyclo.*, No. 118.; and *S.* montàna *Host Sal. Austr.*, i. t. 73. The appearance of stamens being changed into pistils has been observed in the following species:— *S.* hermaphrodítica *L.*, as noticed in *Koch's Comm.*; *S.* Crowe*àna*, as elucidated in *Sal. Wob.*; *S.* polymórpha of *Host's Sal. Austr.*, as shown there; *S.* oleifòlia *Sm.*, as noticed in *Engl. Fl.*; and *S.* bícolor *Ehrh.*, as cited by *Borr.* in *Engl. Bot. Suppl.* *S.* Hoppe*àna*, besides having the majority of its catkins constituted partly of male flowers and partly of female ones, has, in some instances, in the upper flowers of a catkin, the middle one of the three stamens of a flower changed into a perfect ovary; and, hence, the flower seems as if comprising two stamens and an ovary. (*Koch's Comm.*) Smith has noticed what may be a distinct case; viz. that in *S.* frágilis the stamens are not unfrequently accompanied by an imperfect pistil. (*Engl. Fl.*) The combination of the filaments, in some kinds, is a relative subject. Mr. Borrer considers the instance observed in *S.* Crowe*àna* a monstrosity. (*Engl. Bot. Suppl.*, t. 2655.) He adds that the stamens "are represented as changing into" ovaries, "as those of *S.* bícolor *Ehrh.*, and of some of the common sallows, have been observed to do." It is likely that Mr. Borrer would apply the same remark to every instance of the filaments occurring in a state of combination. The following is a list of kinds in which the filaments have been observed in this state; and the practical cultivator may instruct himself by investigating, relatively to the above remark, as many of the following species as may come under his notice when in flower:— *S.* rùbra *Huds.*, noticed in *Eng. Fl.*; *S.* cóncolor of *Host's Sal. Austr.* (whether this be the same as the *S.* rùbra *Huds.*, as the synonyme cited under it indicates, or different); *S.* Crowe*àna* in *Eng. Fl.*; *S.* ripària, as shown in *Host's Sal. Austr.*, i. t. 58.; *S.* lineàris *Forbes*, as depicted in *Sal. Wob.*; *S.* intermèdia of *Host's Sal. Austr.*, i. t. 56., as shown there; *S.* parviflòra *Ibid.*, i. t. 49.; *S.* díscolor *Ibid.*, i. t. 60.; *S* montàna *Ibid.*, i. t. 73. f. 4.; *S.* lanàta *L.*, as shown in *Eng. Bot. Suppl.*; and *S.* cladostémma of

Hayne Dendr., as cited in *Koch Comm.* It seems that Koch (*Comm.*) and Lindley (*Synops. Brit. Fl.*) view the kinds of the group Purpùreæ which have only 1 stamen to a flower, as having that stamen constituted of 2 combined. Besides the kinds of that group treated of in our work, exclusively of *S.* rùbra, which may be examined as to the testing of this view, *S.* oppositifòlia of *Host's Sal. Austr.*, i. t. 38.; *S.* austrìaca *Ibid.*, i. t. 64.; *S.* montàna *Ibid.*, i. t. 73. f. 5.; and *S.* monándra *Ibid.*, i. t. 71., may also be inspected.

The Sexes. Botanists seem to differ in opinion, as to the influence which the sex has upon the character, or appearance, of the plants. Dr. Walker says that "the male and female, of the same species, often differ remarkably from each other in their foliage;" and he instances the *S.* álba *L.*, in the female of which, he says, "the leaves are much larger, greener, and not so white, silvery, and pubescent, as those of the male. This makes the difference in their aspect so great, he says, that, when standing together, they might, at first view, be presumed to be different species. In general," he adds, "the female of most plants is of more vigorous growth, of larger size, and less brittle, than the male; and," therefore, "the female ought always to be preferred when the species is to be cultivated for economical purposes that require strength; and the male for those which require delicacy." (*Essays*, p. 420.) Sir J. E. Smith is of a very different opinion from Dr. Walker, asserting that between a male and a female plant of the same species "there is not the slightest possible difference in the character or appearance of the two individuals, in any other respect" than in their flowers. (*Eng. Flor.*, vol. iv. p. 163.) Most other botanists seem to incline more to the opinion of Dr. Walker, than to that of Sir J. E. Smith (see *Desfontaines's Histoire*, &c., vol. ii. p. 460.; *N. Du Ham.*, vol. iii. p. 104., &c.); and it is only necessary to turn over the figures of the splendid work of Host, in which engravings, a foot or two in length, are given of the male and female of every species, to be convinced that the view taken by Dr. Walker is correct. The importance, then, of knowing to what sex any species of willow belongs that we intend to cultivate for use is obvious. It appears, also, from Dr. Host's work, that the colour of the young wood, in the one sex, often differs from that of the other; for example, the young shoots of *S.* álba, female, are not only stronger, and the leaves broader, than those of the male, but the bark is of a dark red; while the young wood of the male is of a whitish green.

Hybrids. The production of hybrids in this genus was observed by Scopoli in 1760, and has since been confirmed or admitted by most other botanists. "The great number of hybrids in this genus," Koch observes, "no one can deny." (p. 9.) Sir J. E. Smith, however, formed quite a different opinion. During the thirty years that he studied the willows in Mr. Crowe's garden, along with that botanist, "seedlings innumerable," he says, "springing up all over the ground, were never destroyed till their species were determined, and the immutability of each verified by our joint inspection. This was the more material, to set aside the gratuitous suppositions of the mixture of species, or the production of new or hybrid ones, of which, no more than of any change in established species, I have never met with an instance. Strange alterations in the shapes and sizes of leaves, and their stipules, have, indeed, been seen on young radical shoots, from a tree or bush that has been felled; but not more than usually happens in poplars, limes, elms, and others." (*Eng. Fl.*, iv. p. 165.) It is much to be wished that some cultivator of willows would endeavour to originate, scientifically, some hybrids between species with opposite characters of foliage, which would set this question at rest.

Geography. The willows are chiefly natives of the colder parts of the temperate regions of the northern hemisphere. They are generally found in cold moist soil, or by water; the trees on plains, and the creeping or trailing sorts on heaths and mountains. A few species are natives of the arctic circle; and *S.* herbàcea and *S.* árctica approach nearer to the pole than any other ligneous plants. *S.* babylónica is a native of Armenia, and also of China and Japan;

and Royle mentions several species as indigenous both to the lowlands and mountainous regions of Northern India. *S.* pedicellàta *Desf.* and *S.* babylónica are found wild in the north of Africa; and *S.* Humboldti*àna* and *S.* Bonplandi*àna* on the mountains of Peru and Columbia. The species indigenous to North America are not very numerous; but Pursh has described 37 sorts, as either wild or in a state of cultivation there. The number of species in different countries, however, cannot at present be determined with anything like accuracy, since what are considered as species by some botanists are looked upon as only varieties by others. Thus, Schleicher finds 119 species within the narrow limits of Switzerland; Host, 60 species natives of Austria; and Smith, and other British botanists, 71 species indigenous to Britain. Koch, however, the latest, and, as it appears to us, the most judicious, writer on the genus *Sàlix*, considers that all the alleged species, natives of Europe, may be reduced to 48. Perhaps, in addition to these, there may be a dozen natives of North America, which are not natives of Europe; and half that number natives of Asia. Of 182 species described by botanists, Koch observes, 17 only are extra-European.

History. Theophrastus and Pliny speak of different sorts of willows; the latter describing 8 species, as among the most useful of aquatic trees, not even excepting the poplar and the alder. The willow, Pliny says, furnishes long props for supporting vines, and the bark may be employed for tying up the shoots; and the young shoots, he adds, are much employed in basket-making. The kinds which the Romans used for this purpose appear, from Pliny's descriptions, to have been the *S.* álba, *S.* vitellìna, *S.* viminàlis, and the *S.* amerìna of Pliny and Dalechamp, which was probably, as Dr. Walker thinks, the white willow of Theophrastus, and is certainly the *S.* decípiens *L.* These kinds formed the osier holts of the Romans, and are still those principally cultivated for basket-making, throughout Europe and North America, in the present day. Among modern botanists, the Bauhins, in 1650, first began to distinguish willows by their magnitude, the shape of their leaves, and by the nature of their flowers and fruit: and these authors were also the first to recognise in each species a fertile and an unfertile individual; and, with Tragus, to assert that willows could be propagated from seed, like other plants; a fact that had been denied since the days of Aristotle. Scopoli, in his *Flora Carniolica*, published in 1760, relates that he had often observed female willows fecundated by males which are accounted of a different species; and, if this observation is correct, it will help to account for the great number of kinds which compose this genus. The scientific botanical history of the willow may be considered as commencing with Ray's *Synopsis*, in 1660, in which he describes 10 species as growing in the neighbourhood of Cambridge. Linnæus, in 1737, described, in the *Flora Lapponica*, 19 species, chiefly alpine kinds; and in the second edition of his *Species Plantarum*, published in 1753, 31 species. Haller, in 1758, described 21 species as natives of Switzerland; and Villars, in 1789, 30 species as natives of Dauphiné. Willdenow, in his edition of Linnæus's *Species Plantarum*, published in 1797, describes 116 species. Smith, in Rees's *Cyclopædia*, published in 1819, describes 141 species; to which Willdenow and other botanists have since added, according to Koch, 41 species more, making in all 182; adding to these Schleicher's 119 new species, the total number is 254! In 1785, Hoffmann published the first fasciculus of his elaborate *History of Willows*, the last fasciculus of which came out in 1791; but the work was never completed. In so far as it goes, it is a splendid work; and one which can scarcely be surpassed either for accuracy or beauty. In 1828, Professor Koch, director of the botanic garden at Erlangen, published his *De Salicibus Europæis Commentatio*, an admirable work, of which a more particular account will be given here after; in which he has reduced all the European sorts, amounting, as we have just seen, to 237 (17 of the 254 being extra-European), to 48 species, belonging to 10 groups. Subsequently to the appearance of Koch's work, Dr. Host, director of the Flora Austriaca Botanic Garden at Vienna, published his *Salix;* of which only the first volume ap-

peared before the author's death. This volume is limited to figuring and describing the willows of Austria, amounting to 60 sorts; of which engravings are given of both sexes, on extra-large folio plates: the specimens being of the natural size, and mostly from 1 ft. 6 in. to 2 ft. in length; exhibiting both sexes when in flower, when the leaves are fully expanded, and the female catkins matured. This is indeed a splendid work, and only equalled by the small portion which appeared of the *Historia Salicum* of Hoffmann, before mentioned. A great drawback, however, to the utility of Host's work is, that the author has given new names to most of his sorts, and has identified but a very few of them with the kinds described by other botanists.

In 1829, His Grace the Duke of Bedford had printed, for private circulation, the *Salictum Woburnense*, in which 160 species are figured and described; all of which, with the exception of a very few, were at that time alive in the salictum at Woburn. The engravings are small, but good; the descriptions are chiefly taken from Smith, but are partly original, by Mr. Forbes, the Duke of Bedford's gardener. "We have in the *Salictum Woburnense*," Sir W. J. Hooker observes, "a standard set of figures of all the British, amongst many exotic, species; which, together with those of the *English Botany*, do, it must be confessed, give to the British naturalist an advantage over all that Continental authors have published on the subject; and to them I refer in every instance, and with great satisfaction. The arrangement of the species in the *Salictum* is due to the botanical skill and knowledge of Mr. Forbes, head gardener at Woburn, which His Grace has fully acknowledged; and that department does him great credit." (*Br. Fl.*, i. p. 416.)

In 1831, Sir W. J. Hooker, in the second edition of his *British Flora*, had, with the aid of Mr. Borrer, arranged the British species in 18 groups, and enumerated under these 68 species, considered by him and others as indigenous; which, in the third edition of the *British Flora*, published in 1835, were increased to 71. In the same year (1835), Dr. Lindley adopted the system of Koch in his *Synopsis of the British Flora*, 2d edit., and reduced the 71 species of Smith and others to 28 species.

The willows of North America were, as far as they were known in 1814, described by Pursh, with the assistance of Mr. G. Anderson, who had in cultivation several rare species from that country; and some species have subsequently been added by Nuttall. Since then, Dr. Barratt of Middletown, Connecticut, has undertaken to describe all the willows grown in America, whether indigenous or exotic, amounting to 100, a conspectus of which he has sent to Sir W. J. Hooker, arranged in 9 groups, chiefly the same as those of Mr. Borrer. Cuttings of most of these 100 sorts have been received by the Duke of Bedford, and planted in his salictum at Woburn, where many of them are alive. Some other particulars respecting them will be found in the *Companion to the Botanical Magazine*, vol. i. p. 17. As Dr. Barratt's descriptions must necessarily, in great part, be taken from dried specimens, it appears to us very doubtful how far they will be of use to the European botanist; but there can be no doubt as to the benefit which will result from the introduction of all these sorts into British gardens, because there they may be compared in a living state with the kinds we already possess.

Lightfoot, in his *Flora Scotica*, paid considerable attention to willows; but, according to Sir J. E. Smith, "he laboured at the subject with hesitation and mistrust, from an opinion of the species being confounded by cross-impregnation." Lightfoot, and his contemporary Hudson, therefore, Sir James adds, have hardly enumerated a fourth part of the native willows of our island. The cultivation of willows, with a view to the determination of their specific characters, was, according to Sir J. E. Smith, first taken up with vigour and effect by James Crowe, Esq., F.L.S., of Lakenham, near Norwich, "a most excellent British botanist," about the end of the last century; and Sir James E. Smith, writing in 1828, says that he had laboured full 30 years in the study of willows in Mr. Crowe's garden, which contained all the sorts that could then be procured in any part of Britain. (*Rees's Cycl.*) Mr. George

Anderson, F.L.S., had at that time a collection at West Ham, in Essex, which he was studying for the same purpose; as had Edward Forster, Esq., at Walthamstow, and which has since been removed to Woodford, in Essex; and W. Borrer, Esq., at Henfield, in Sussex. At Lewes, in the same county, Mr. Woollgar had extensive willow grounds, studied the species very assiduously, and communicated several facts to Sir J. E. Smith. Subsequently, a collection was made by His Grace the Duke of Bedford at Woburn, which appears to have been the most extensive till then made in England; and the next greatest number of sorts is in the arboretum of Messrs. Loddiges, at Hackney. In all these salictums, we are informed by those who have examined them, the plants were placed too closely together to attain their characteristic form and size. At Woburn, the plants were, till 1836, crowded together in a very limited space, which necessarily prevented their habits from being properly studied; but they have since been transplanted, and allowed more room; though they are not, even now, as it appears to us, in a situation either sufficiently large, or adequately exposed to the influence of the sun and the air. A few species of willows have attained the size of trees in the Horticultural Society's Garden; but, as far as we are aware, there is no extensive collection of full-grown willows any where either in Britain or on the Continent. Most of the kinds in the Woburn salictum are in the arboretum at Flitwick House, at Goldworth, and at Messrs. Loddiges's, Hackney; and we believe, also, that there are excellent collections in the principal botanic gardens, more especially in that of Edinburgh. The Duke of Bedford, indeed, has liberally contributed cuttings from his collection at Woburn to all who have applied for them; so that, if willows are not in future extensively cultivated, and properly studied, it will not be for want of plants, but from the cultivators not allowing them sufficient room to attain their natural size and habits. On the Continent, the best collections are in Germany, and principally, we believe, at Erlangen, under the direction of Koch. Dr. Host is said to have cultivated upwards of 300 sorts in the botanic garden under his care at Vienna; and there are good collections at Göttingen, Bremen, and Berlin.

In an economical point of view, scarcely anything was added to our knowledge of the culture and uses of the willow since the time of the Romans; till the slight notices of the uses of willows given by Ray, and afterwards by Evelyn. The first systematic essay on the subject appears to have been written by Dr. Walker, about the latter end of the last century, though not published till 1812. It is entitled *Salicetum; or, the Botanical History and Cultivation of Willows*; and it is contained in his volume of *Essays*, p. 403—469. Here 22 species are described, and an account is given of their uses and mode of cultivation. All these species, and various others, which are promised to be described in a future volume, were cultivated by the author in his garden at Collinton, near Edinburgh.

Salices, &c., by Dr. Wade, was published in 1811, and contains descriptions of most of the European species at that time known, with directions for their propagation and culture.

Willows for basket-making and hoops were principally imported from Holland and France, till towards the commencement of the present century; when our exclusion from the Continent, in consequence of the continued war, led to the formation of plantations at home. The Society of Arts, directing their attention to the subject, have, at various times, offered premiums for the cultivation of willows; and in their *Transactions* for 1801, 1804, and 1805, as well as in previous and subsequent volumes, will be found accounts of plantations made for which premiums were awarded. In England, the principal of these plantations were made by Arthur Borron of Warrington, in Lancashire; Mr. Wade of Suffolk; and Mr. Phillips and Mr. Bull of Ely: and, in Scotland, by Mr. Shirreff, at Captainhead, near Haddington.

The principal plantations of willows for basket-making, in every country, are made along the banks of rivers and streams; and, in England, those on the

Thames and the Cam are the most celebrated. In both these rivers, and in some others, small islands are frequently planted entirely with willows, and are called osier holts. There are many such islands in the Thames, between London and Reading. The most extensive willow plantations in fields are in the fenny districts of Cambridgeshire and Huntingdonshire; and, perhaps, the largest plantation in England is that of Mr. Adnam, near Reading. The principal market for basket willows is London; but they are in demand, more or less, in every town in the country. The willow is frequently cultivated as a pollard, the lop being valuable for fence-wood, poles, hurdles, and fuel. It is sometimes, also, cultivated as a timber tree; but, as an ornamental tree or shrub, it may be considered to be in a great measure neglected.

Properties and Uses. The importance of the willow to man has been recognised from the earliest ages; and ropes and baskets made from willow twigs were probably among the very first of human manufactures, in countries where these trees abound. The Romans used the twigs for binding their vines and tying their reeds in bundles, and made all sorts of baskets of them. A crop of willows was considered so valuable in the time of Cato, that he ranks the salictum, or willow field, next in value to the vineyard and the garden. In modern times, "the many important uses," Sir W. J. Hooker observes, "rendered to man by the different species of willow and osier, serve to rank them among the first in our list of economical plants." In a state of nature, the willow furnishes food by its leaves to the larvæ of moths, gnats, and certain other insects; and, by its flowers, to the honey-bee. Its wood, also, is preferred to most others by the beaver. The leaves and young shoots are wholesome and nourishing to cattle; and in some northern countries they are collected green, and then dried and stacked for that purpose. In France, those of *S.* càprea, whether in a green or dried state, are considered the very best food for cows and goats; and horses, in some places, are fed entirely on them, from the end of August till November. Horses so fed, it is stated, will travel 20 leagues a day without being fatigued. (*Bosc.*) In the north of Sweden and Norway, and in Lapland, the inner bark is kiln-dried and ground for the purpose of mixing with oatmeal in years of scarcity. In a rude state of civilisation, the twigs of the willow were used in constructing houses, household utensils, panniers, the harness of horses and cattle, and for various purposes connected with boats and fishing. The twigs are still very generally applied, in Russia and Sweden, to all these uses; and Dr. Walker relates that he has ridden in the Hebrides with a bridle made of twisted willow twigs, and lain all night at anchor with a cable made of the same material. The bark of the trunks of young trees is used generally, throughout the north of Europe, for the same purposes as that of the lime tree (See p. 368.); and in Tartary, it is said, it is macerated, and the fibre, when separated, spun into threads, from which cloth is woven.

The bark of the willow, and also the leaves, are astringent; and the bark of most sorts may be employed in tanning. That of *S.* càprea is used both for tanning and dyeing black, in Sweden, the north of Scotland, and Switzerland. (*Walker.*) A substance called salicine has been extracted from the bark of *S.* Russelliàna, *S. H*èlix, and some other kinds of willow, which Professor Burnet states to have been "proved to be equally efficient with the Peruvian bark;" and he remarks on the wise provision of Providence, in placing the remedy for agues, and other low fevers, exactly in those moist marshy situations where these diseases are most prevalent. (See *Burnet's Inaugural Address to the Medico-Botanical Society*, February, 1831, p. 12.) This new principle was first discovered by M. Leroux; and M. Majendie states that he has known three doses of 6 grains each stop a fever; which is nearly the same quantity as would be required for the same purpose of sulphate of quinine. (*Annales de Chimie*, tom. xliii. p. 440., as quoted in *Brande's Journal* for 1831.) Salicine is in the form of very fine nacreous whitish crystals, perfectly soluble in water or alcohol. It is very bitter, and partakes something of the colour of willow bark. The process for obtaining it is rather long; and it requires about 3 lb.

of willow bark, when dried and pulverised, to yield 1 oz. of salicine. (*Ibid.*) The wood of the willow is soft, smooth, and light: that of the *Sàlix càprea* is heavier than that of any other species of the genus, weighing, when dry, 41 lb. 6 oz. per cubic foot, and losing a twelfth part of its bulk in drying; that of *Sàlix* álba weighs 27 lb. 6 oz. per cubic foot when dry, and loses, in drying, somewhat more than a sixth part of its bulk. In Pliny's time, willow wood was in request for the fabrication of shields, on account of its lightness; and in the present day, it is, for the same reason, preferred for making cutting-boards for the use of shoemakers and tailors. It is also used for whetting the fine steel instruments of cork-cutters, and other mechanics. It is in demand for turnery, and for shoes, shoemakers' lasts, and toys; for dyeing black, in imitation of ebony, as it takes a fine polish; and for a great variety of minor purposes. The wood of the larger trees, such as *S.* álba and *S.* Russell*iàna*, is sawn into boards for flooring, and sometimes for rafters; in which last situation, when kept dry and ventilated, it has been known to last upwards of a century. The straight stems of young trees, when split in two, make excellent styles for field ladders, on account of their lightness. The boards are well adapted for lining waggons and carts, particularly such as are intended for coals or stones, or any hard material, as willow wood, like other soft woods, is by no means liable to splinter from the blow of any hard angular material. It is also valued for the boards of the paddles of steam-vessels, and for the strouds of water-wheels, as it wears in water better than any other kind of wood. The red-wood willow, or stag's-head osier (*S.* frágilis), according to Mathew, produces timber superior to that of *S.* álba, or of any other tree willow. It is much used in Scotland for building small vessels; and especially for fast-sailing sloops of war, by reason of its lightness, pliancy, elasticity, and toughness. The wood, when dry, is easily known from that of all other willows, by its being of a salmon colour; on which account it is sometimes used in cabinet-making and for children's toys. " Formerly," says Mathew, " before the introduction of iron hoops for cart wheels, the external rim, or felloe, was made of this willow; and, when new, the cart or wain was drawn along a road covered with hard small gravel (and, in preference, gravel somewhat angular); by which means the felloe shod itself with stone, and thus became capable of enduring the friction of the road for a long time, the toughness and elasticity of the willow retaining the gravel till the stone was worn away. Under much exposure to blows and friction, this willow outlasts every other home timber. When recently cut, the matured wood is slightly reddish, and the sap-wood white. When exposed to the air, and gradually dried, both are of salmon colour, and scarcely distinguishable from each other." (*On Nav. Timb.*, p. 63.) *S.* Russell*iàna* being very nearly allied to *S.* frágilis, its wood has, probably, the same characteristics. The longer shoots and branches of the tree willows are made into poles for fencing, hop-poles, props for vines, and other purposes; and, when forked at one end, into props for supporting lines for clothes. They are also much used for the handles of hay-rakes, and other light agricultural implements; and they are split, and made into hurdles, crates, and hampers; and, when interwoven with the smaller branches, into racks, or cradles, for the hay and straw given to cattle in the fields, or in feeding-yards. The smaller rods, with or without the bark on, are manufactured into various kinds of baskets, for domestic use; and, split up into two, four, or more pieces, for making lighter and ornamental articles, such as work-baskets, ladies' reticules, &c. It is a remarkable fact, that basket-making was one of the few manufactures in which the ancient Britons excelled in the times of the Romans. These baskets, or bascaudæ, as they are called by Martial, are said to have been of very elegant workmanship, and to have borne a high price. (See *Encyc. Brit.*, art. Basket-making.) At Caen, in France, hats are manufactured from strips or shavings of the wood of the *S.* álba, in the same manner as they are manufactured in Switzerland from shavings of the wood of *Dáphne* Lauréola; and as they were, some years ago in Essex, from the wood of *Pópulus* fastigiàta. Branches of two or three years' growth are taken and cut up into thin slices

with an instrument called a shave, and afterwards divided into ribands by a steel comb with sharp teeth. Similar willow hats were formerly manufactured in England, and sheets of what is called willow, which is a kind of stuff woven with fine strips of the wood and afterwards stiffened, are still in common use for the framework of bonnets; and, when covered with felt, for light cheap summer hats. This stuff is chiefly manufactured by the weavers at Spitalfields, where one set of persons cut the willows into thin strips, and others weave these strips into sheets.

The downy substance which envelopes the seeds is used by some kinds of birds to line their nests; and by man, occasionally, as a substitute for cotton, in stuffing mattresses, chair cushions, and for other similar purposes. In many parts of Germany, it is collected for making wadding for lining ladies' winter dresses; and a coarse paper may be formed of it. The shoots of willows of certain vigorous-growing kinds, when cut down to the ground, produce, in two years, rods which admit of being split in two for hoops for barrels; while others, in one year, produce shoots more or less robust, and of different degrees of length, which are used, with or without their bark on, for all the different kinds of basket-making and wickerwork. This last application, indeed, is by far the most general purpose to which the willow is applied. In the neighbourhood of London, the market-gardeners use the smaller shoots of *T.* decípiens for tying up broccoli, coleworts, and other vegetables sent to market in bundles; and, both in Britain and on the Continent, the smaller shoots of willows are used for tying the branches of trees to walls or espaliers, for tying up standard trees and shrubs into shape, for making skeleton frames on which to train plants in pots, for tying bundles and packages, and for a thousand other purposes which are familiar to every gardener, or will readily occur to him in practice. The lop of willows, and all the branches or old trunks which can be applied to no other useful purpose, make a most agreeable fuel, producing, when dry, a clear fire with little smoke; but, when the wood is moist, it is apt to crack. In the time of Evelyn, willow wood appears to have been that principally used in the manufacture of charcoal, both for smelting iron, and for gunpowder; but, for the former purpose, it has long given way to the coke of mineral coal. It is still in request for gunpowder, on account of its taking fire readily, and is esteemed by painters for their crayons.

The uses of the entire plant are various. Almost all the species being aquatics, and of rapid and vigorous growth, they are peculiarly fitted for planting on the banks of rivers and streams, for restraining their encroachments, and retaining the soil in its place. Various other trees and shrubs, from being also aquatics, and having numerous roots, are, no doubt, adapted for this purpose, such as the alder; but the willow has this great advantage, that it grows readily by cuttings, and, therefore, does not require the soil to be disturbed by the operation of planting. As coppice-wood, to be cut down every six or eight years, *S.* càprea and its numerous varieties are valuable plants; few others producing so great a bulk of hoops, poles, and faggot-wood in so short a time, in a cold, moist, undrained soil. *S.* álba is also an excellent species for coppice, where the soil is drier and better; and forms a good nurse for plantations of timber trees that are made in moist situations. The shrubby kinds make hedges, both in dry and in moist soil; but, in the latter, such hedges are of most value on account of the use of their annual shoots in basket-making. The sorts of willow that can be grown for timber with most advantage are, *S.* álba, *S.* Russell*iàna*, *S.* frágilis, *S.* càprea, and some others, which we have enumerated under the head of Culture. The trees which are most ornamental are, the well-known *S.* babylónica, *S.* álba mas, *S.* álba fœm., *S.* vitellìna, *S.* pentándra, *S.* acutifòlia, *S.* præ'cox, *S.* purpùrea, *S. H*èlix, *S. a*mygdálina, and some others. *S.* càprea is remarkable for the profusion of its flowers; *S.* vitellìna, for its yellow bark; *S.* decípiens, for its white cane-like shoots; and *S.* acutifòlia, and *S.* præ'cox for their purple shoots, covered, when not exceeding three or four years' growth, with a delicate bloom, like that of

the plum. All the shrubby species are interesting or beautiful when planted singly, and allowed to take their natural shapes; but, unless planted very thinly and allowed to grow old and round-headed, they do not mass well together. They are therefore well adapted for the arboretum, and for indicating water, or moist situations, but not for general use in ornamental plantations. Whereever willows are planted for the beauty of their blossoms, the male plant should be chosen; because the colour and effect are produced chiefly by the anthers. Willows in general, Gilpin observes, are trees of a straggling ramification, and but ill adapted for use in artificial landscape; "except as pollards to characterise a marshy country; or to mark, in a second distance, the winding banks of a heavy, low, sunk river; which could not otherwise be noticed." Some species, he says, he has admired; and he particularises the *S.* álba, as having a "pleasant, light, sea-green tint, which mixes agreeably with foliage of a deeper hue." By far the most beautiful willow, when in flower, is *S.* càprea, the catkins of which are not only larger than those of every other species, but produced in greater abundance. Hence the great beauty of this willow in early spring, and its importance as furnishing food to bees. "It is in flower," says Dr. Walker, speaking with reference to the climate of Edinburgh, "between the 15th of March and the 8th of April. During this time, whenever the thermometer is at or about 42° in the shade, accompanied with sunshine, the bees come abroad. This is a temperature which often occurs; and, if bees have an opportunity, during that interval, of feeding three or four days upon this willow, the hive will be preserved, when, without this, it would probably perish."

As a curious use of the willow, it is mentioned in the *Nouveau Du Hamel*, that the roots are more readily changed into branches, and the branches into roots, than in any other species of a tree. All that is necessary is, to take up a plant, and bury the whole of the branches in the soil, leaving the whole of the roots above ground. Poiret, the writer of the article, says he saw this done, in the neighbourhood of Marseilles, with a great number of plants of *S.* álba; that the larger twisted roots became the principal branches, and preserved their general forms; but that the young shoots produced by these took the forms and appearances common to the species in its natural state.

Poetical and legendary Allusions. The willow does not appear to have been celebrated by any of the Greek poets, nor by any of the Latins, before the Augustan age. Herodotus, however, speaks of the willow divining-rods of the ancient Scythians; and the use of the willow in basketwork, &c., is mentioned by many of the Latin prose writers. Martial alludes to the baskets (*bascaudæ*) made of willow twigs by the ancient Britons.

> "Barbara de pictis veni bascauda Britannis:
> Sed me jam mavult dicere Roma suam."

> "From Britain's painted sons I came,
> And Basket is my barbarous name:
> But now I am so modish grown,
> That Rome would claim me for her own."

The druids are said to have formed huge figures of wickerwork, which, on great occasions, were filled with criminals, and set fire to (see *Sat. Mag.*, vol. i. p. 74.): but these baskets, according to Burnet and others, were formed of the twigs of the oak, and not the willow. Virgil, Lucan, and many other of the Latin poets, speak of the boats, shields, and other articles formed, both by the Britons and Romans, from the twigs and branches of this tree.

> "The bending willow into barks they twine,
> Then line the work with spoils of slaughter'd kine."
> Rowe's *Lucan*, book iv.

Ovid gives a very good description of the situation in which willows generally grow: —

> "A hollow vale, where watery torrents gush,
> Sinks in the plain; the osier and the rush,
> The marshy sedge and bending willow, nod
> Their trailing foliage o'er the oozy sod." *Met.*, lib. vii.

Among the British poets who have sung this plant, most have alluded to the willow being considered the emblem of despairing love. Herrick says, —

> " A willow garland thou didst send
> Perfumed last day to me;
> Which did but only this portend,
> I was forsook by thee.
> Since so it is, I 'll tell thee what,
> To-morrow thou shalt see
> Me wear the willow, after that
> To die upon the tree:"

and Spenser calls the tree

> " The willow, worn by forlorn paramour."

Shakspeare thus represents Dido lamenting the loss of Æneas: —

> ——— " In such a night
> Stood Dido, with a willow in her hand,
> Upon the wild sea banks, and waved her love
> To come again to Carthage;"

and, again, in relating the death of Ophelia, —

> " There is a willow grows ascaunt the brook
> That shows his hoar leaves in the glassy stream.
> Therewith fantastic garlands did she make,
> Of crow-flowers, nettles, daisies and long purples.
> There on the pendent boughs her coronet weeds
> Clambering to hang, an envious sliver broke;
> When down her weedy trophies and herself
> Fell in the weeping brook."

Cowper says, —

> " We pass a gulf in which the willows dip
> Their pendent boughs, stooping as if to drink."

The allusions to this tree by modern poets are still more numerous; but, as they are too many to be all quoted, and as most of them are, besides, very well known, we shall content ourselves with the following: —

> " Odours abroad the winds of morning breathe,
> And, fresh with dew, the herbage sprang beneath:
> Down from the hills that gently sloped away
> To the broad river shining into day
> They pass'd; along the brink the path they kept,
> Where high aloof o'erarching willows wept,
> Whose silvery foliage glisten'd in the beam,
> And floating shadows fringed the chequer'd stream." MONTGOMERY.

The quotation from Lord Byron, given below, refers to the weeping willow, and to the beautiful passage, hereafter quoted, when speaking of *Sàlix babylónica*, from the *Psalms of David*.

> " On the willow thy harp is suspended,
> O Salem! its sound should be free;
> And the hour when thy glories were ended
> But left me that token of thee;
> And ne'er shall its soft notes be blended
> With the voice of the spoiler by me." *Hebrew Melodies.*

The legendary origin of the weeping willow, according to the Arabian story-tellers, is as follows. " They say that, after David had married Bathsheba, he was one day playing on his harp in his private chamber, when he found two strangers opposite to him, though he had given strict orders that no one should intrude upon his privacy. These strangers were angels, who made him convict himself of his crime, nearly in the same manner as it is related in Holy Writ. David then recognised in the strangers the angels of the Lord, and was sensible of the heinousness of his offence. Forthwith he threw himself upon the floor, and shed tears of bitter repentance. There he lay for forty days and forty nights upon his face, weeping and trembling before the judgment of the Lord. As many tears of repentance as the whole human race have shed, and will shed on account of their sins, from the time of David till the judgment-day, so many did David weep in those forty days, all the while moaning forth psalms of penitence. The tears from his eyes formed two streams, which ran from the

closet into the anteroom, and thence into the garden. Where they sank into the ground, there sprang up two trees, the weeping willow, and the frankincense tree: the first weeps and mourns, and the second is incessantly shedding big tears, in memory of the sincere repentance of David." (*Language of Flowers*, p. 39.) The branches of one of the weeping willows on the banks of the Euphrates are said to have caught the crown from the head of Alexander the Great, when he passed under the tree in a boat on that river; a circumstance which made the Babylonish diviners predict his early death.

Soil and Situation. Almost all the willows are found naturally either in a cold soil and moist climate, or, if in a sandy soil, within reach of water. The low-growing kinds are sometimes, however, found in dry arid soils; but in such soils they are never in a thriving state. Willows are very seldom found growing on moist peat bogs; the only species observed in such situations by Steele being the *S.* càprea and the *S.* pentándra, and these only sparingly in peat bog that was dry. (See *Steele's History of Peat Moss*, p. 4.) This author tried the *S.* álba, *S.* frágilis, *S.* viminàlis, and, in general, all the largest and best willows, in every possible way, in peat soils; and states that he is "satisfied that they will not grow there, even on the sides of moss (peat bog) ditches." (*Steele* in *Gard. Mag.*, vol. iii. p. 256.) It will be recollected that the moss here spoken of consists entirely of peat, without any admixture of earthy matter; and is totally different from the heath mould, which, in the neighbourhood of London, is often improperly called peat. It is observed by Desfontaines, that willows, taken from the Alps, and planted in gardens, so completely change their character and general aspect, as not to be recognisable for the same species. Narrow leaves become broad; those which are shaggy and woolly, often smooth and shining; and plants only 1 ft. or 2 ft. high attain the height of two or three yards. It has also been observed, that the wood of willows, whether that of the trunks and branches, or of the young shoots, is smaller, harder, tougher, and more compact and durable, than that of willows grown in rich moist soils. In dry soils, also, the growth of the plant is much slower than in moist ones. From these data, it may reasonably be deduced, that, when the object of growing willows is to preserve the forms which they have in their natural habitats, these habitats should be imitated as much as possible; and that, on the contrary, when the object is to ascertain what are species, and what only varieties, the soil and situation should be uniform for all the sorts, of a richer quality, and of a description more favourable for rapid growth, than what occurs to the average number of sorts in a state of nature. Where bulky produce, either in timber, branches, rods, or twigs, is the object, the soil ought to be good, and the situation and other circumstances favourable to rapid growth. The best situation, when the object is free and rapid growth, is on the sides of rivers and brooks which pass through a level country. In such situations, the timber-producing kinds attain a larger size than in any other; and larger hoops and basket-rods are there also produced: but both kinds of produce may also be obtained in dry upland soils, that are deep and free; and the wood from such soils will be of a finer grain, and the hoops and basket-rods smaller and tougher, than when the growth has been impelled by an extraordinary supply of water. The best tree willow for thriving in dry uplands is the *S.* álba; and the best basket willow is the grey or brindled willow, first recommended by Phillips of Ely, under that name.

Propagation. All the willows are propagated by cuttings; though some of the more rare alpine kinds root with difficulty. Some species propagate very readily from seeds; and there can be little doubt that grafting, and other similar modes of propagation, would be as successful in this genus as in most others. The cuttings for plants which are to be grown in nurseries previously to their removal to their final situation may be made of one-year-old wood, about 1 ft. in length, cut straight across at the lower end, and sloping at the upper end. They may be about 1 ft. in length, 9 in. of which should

be inserted in the soil; the cutting being placed perpendicularly, and the soil pressed firmly to it, more especially at its lower extremity. The reason why the lower end of the cutting is cut directly across, and not sloping like the upper end, is, that it may form an equal callosity all round it, and, consequently, throw out an equal number of roots from that callosity on every side. The reason why the cutting is placed upright is, that the roots may be principally formed at its lower extremity; because that makes a handsomer and more symmetrical plant than when the roots are protruded partly from the lower end, and partly from the side. It is found from experience, that, when a cutting is put in in a sloping direction, roots are protruded nearly equally through all that part that is buried in the ground, unless the soil has been more closely pressed against one part than another; in which case the roots will there be protruded in greater abundance; and, if the soil has not been pressed to the lower extremity, it will probably produce no roots at all there, but rot. The upper extremity of the cutting is cut in a sloping direction, merely to throw off the rain. When willows are to be planted where they are finally to remain, cuttings may be made of the two-years-old wood, about 2 ft. long, and cut in a sloping direction at both ends. The advantages of choosing the two-years-old wood is, that the plants produced are more vigorous, which is not always desirable in plants that are to be transplanted, on account of their greater bulk, and the consequent expense of their removal. The cuttings of the two-years-old wood should be inserted in the ground, either by means of an iron-pointed dibber, or merely by being pushed in, at least 10 in. in length, and made firm by treading, They should be inserted in a slanting direction; in consequence of which, and also of being made firm during the whole length of the part buried in the soil, roots are protruded not only at the lower end, but throughout the whole length of the part which is in the ground. This mode of making cuttings, and of inserting them, is more particularly necessary when a plantation of willows is made in a grassy surface on the banks of rivers or streams. Cuttings of the smaller kinds of willows, and especially of those kinds which are somewhat difficult to strike, should be planted in a sandy soil, in a shady situation, and kept moist. The few that are extremely difficult to strike should have their cuttings formed of the growing wood with the leaves on; and, after being planted in sand, they should be covered with a hand-glass. The best season for putting in cuttings of the winter's wood is the autumn, in consequence of which the buds swell during the winter, and are ready to grow with vigour in the spring; but in wet soil, and in climates where they are liable to be loosened by the frost in the winter season, cuttings planted in autumn ought to be made firm a second time in the spring.

The principal willow which propagates itself by seeds in Europe is the *S. càprea*, and its very numerous allied kinds. The seeds are small and black, and enveloped in a tuft of cottony matter. They are ripe in May, or early in June; and they are speedily dispersed by the wind. If they fall in soil moist and shaded from the sun, or if a heavy shower of rain happen soon afterwards, they will spring up in three weeks, and produce plants 3 in. or 4 in. high before the end of the season. In France, Bosc informs us, this kind of willow is sometimes raised from seed, in the government nurseries, for transplantation into the national forests; and all that it requires is, to be sown on an even surface, well watered, and very slightly covered with loose litter. We are not aware of the willow having ever been grafted, though we think very curious and beautiful plants might be formed by grafting the trailing sorts standard high, or by grafting a number of sorts on one tree. In some parts of England, seedling willows are collected in the indigenous woods by the country people, by whom they are sold to the local nurserymen, who grow them for one or two years, after which they are ready for planting in coppice-woods.

Culture. The first point to be attended to in the culture of any species of willow, no matter for what purpose, is, to determine whether the male or the

female plant is the more desirable kind for the object of the cultivator. There can be no doubt that the female of every species is the more vigorous-growing plant; and, consequently, where timber or coppice-wood, hoops, or rods for the larger kinds of basketwork, are the produce wanted, the female of the species to be cultivated ought to be preferred, however difficult it may be, in the present state of the nursery culture of willows, to procure plants the sex of which is known. On the other hand, as we have before observed, when tough, yet delicate, rods are required for basket-making, not only the finer-growing species, but the males of these species, ought to be selected. It ought also to be borne in mind, as a general principle, that willows, to be of any use, either as basket-rods, hoops, poles, or timber trees, must annually ripen their shoots; and that, in cold climates, this cannot be done where they are grown in soil which is abundantly supplied with water late in the season. Hence the colder the climate, the drier should be the soil; on account of the necessity of perfectly ripening the wood. In regard to general management, few ligneous plants require so little care as the willow, when cultivated as timber or coppice-wood; but considerable care is requisite where it is grown for hoops or rods for wickerwork.

Culture of Tree Willows. Willow groves, or plantations of the tree in masses for the production of timber, are best formed in low moist bottoms, which, however, must be drained in such a manner as that the soil may never become saturated with stagnant water. When planted in rows, or as single trees, the most eligible situation for the willow is along the high banks of rivers, brooks, or ditches. Some sorts, and especially *S.* álba and *S.* Russelli*àna*, may also be planted in upland soil in masses; and *S.* càprea will succeed in cold, boggy, or marshy soil, if drained; but neither this nor any other kind of tree willow will produce timber in peat, gravel, sand, or chalk. When willows are intended to remain where they are first planted, and to grow up as trees, all that is necessary, at the end of the first year's growth, is to cut off all the shoots but the strongest one, which is left to become the stem of the future tree. The after-management of thinning, pruning, &c., differs in nothing from the ordinary routine culture of timber trees. In felling willow trees when the bark is an object, the trees may either be barked standing, in the month of May, and cut down in the August following; or cut down in May, and disbarked while lying on the ground.

Choice of Species for growing as Timber Trees. *S.* álba, which will attain the height of from 60 ft. to 80 ft. in 20 years. *S.* Russelli*àna* and *S.* frágilis, which are frequently confounded; and, indeed, in external appearance differ very slightly from each other, except in size. *S.* Russelli*àna* grows as rapidly, and to as great a height, as *S.* álba; but *S.* frágilis, though it grows with equal rapidity, does not attain so great a height. *S* càprea, and some of its allied kinds, grow as rapidly as *S.* frágilis for three or four years; and will attain nearly the same height as that species in the same time; that is, on good soil, from 30 ft. to 40 ft. in twenty years. According to Bosc, *S.* càprea is the most valuable of all the tree willows grown in France. Other willows, which attain a timber-like size, or about 30 ft. or 40 ft. in twenty years, are, *S.* triándra, *S.* rotundàta, *S.* lùcida, *S.* Meyeri*àna*, *S.* præ`cox, *S.* Pontedera*àna*, *S.* acuminàta, *S.* pentándra, *S.* vitellìna, and *S.* amygdálina. Many, and perhaps most, of the other species, in good soil, if allowed sufficient room, and trained to a single stem, would attain the size and character of trees; but, with a view to timber, the four species first mentioned, viz. *S.* álba, *S.* Russelli*àna*, *S.* frágilis, and *S.* càprea, are alone worth cultivating.

Culture of the Willow as Coppice-wood. The best sorts for this purpose are *S.* càprea and its allied kinds. Plants may either be raised from cuttings or from seeds, which are produced in great abundance. In the plantation, they may be placed at 4 ft. or 5 ft. apart every way; and afterwards thinned out as the stools increase in size. No other species of willow will produce such vigorous shoots in a bad soil; and in a good soil, after being cut over, shoots of one year may frequently be found from 10 ft. to 12 ft. in

length, and 2 in. in diameter at the lower end. Such shoots make excellent hoops, or rods for cratework, hurdles, and different other wickerworks, and also rods for tying plants, and for fencing. In good soil, a coppice of this species, will produce the greatest return in poles, hoops, and rods, every five, six, seven, or eight years; and in middling soil, where it is grown chiefly for faggot-wood, it will produce the greatest return every three, four, or five years. In bad soil (and on such soil only should it be grown for the leaves), the plants should be cut over every year, or every two years, in the month of August, and the leaves dried in the same manner as hay, and afterwards stacked. We are aware that there is a great prejudice in Britain against feeding cattle with the shoots of any description of ligneous plant, either in a green or dried state: but let it be recollected that there is one exception in the case of the furze; and, if that is found so well worth culture as a herbage plant, why may not the willow be found equally advantageous for a similar purpose, under particular circumstances of soil, situation, and climate?

For the coarser description of basketwork, the plants in a coppice-wood may be cut over every year in the beginning of November. To preserve the vigour of the stools, the shoots should not be cut over when in a green state, in August, for two years in succession; but a crop of the twigs with the leaves on, cut at the end of August, should alternate with a crop of the twigs without the leaves, cut in the following year in November. (See *Bosc Nouv. Cours. d'Agri.*, tom xiii. p. 440.) These rules are founded on a principle laid down by Varrennes de Fenille, that the poorer the soil is, the oftener the wood that grows on it ought to be cut over.

The Culture of the Willow for Hoops. The best sorts for this purpose are *S.* viminàlis and *S.* càprea. It is observed by Dr. Walker, that the *S.* viminàlis was cultivated for hoops, in Holland, from the first establishment of the herring fishery in that country, which, according to M'Culloch, was in 1164; or, rather, from the epoch of the Dutch learning to pickle their herrings, and pack them in barrels, which they were taught to do by Beukelson, who died in 1397, and to whose memory Charles V. erected a magnificent tomb at Biervliet, near Sluys. The Dutch boors, Dr. Walker informs us, without knowing any thing of the sexes of willows, selected those plants of *S.* viminàlis that appeared to them to be of the most vigorous growth, and thus unintentionally propagated only the female. As all the plants of *S.* viminàlis grown in Scotland were originally obtained from Holland, they are, consequently, almost all females; and we suppose the same thing is the case in England. We mention this circumstance here, because it shows the practical use that may be made of a botanical knowledge of willows; since, by ordering the female only of any given species, the planter may be sure of having all strong and vigorous-growing plants. The soil, for a plantation of hoop willows, ought to be good and deep, well trenched, and even manured, before planting the sets. It should be in a situation naturally moist, but so thoroughly drained as at no time to be stagnated by water. The drains should be at regular distances, so as to throw the surface between them into beds, or compartments; and they may be made open, or built up on the sides, and covered with flagstone. If they can be so arranged as to be filled with water at pleasure, in the early part of summer, that circumstance will contribute materially to the rapid growth of the plants. Hoop willows may be grown along the high banks of rivers or ditches where the extremities of the roots will reach the water, but where the great body of them are in the soil above its level, with perfect success; but it is in vain to plant them upon poor or dry soil, or upon soil, whether rich or poor, which is continually saturated with water to within a foot or two of the surface. The cuttings may be planted in rows 2 ft. apart, and at 18 in. distance in the rows. The shoots produced should not be cut off till the second year after planting; as by this time, as Sang observes, "they will generally have formed one strong shoot, with, probably, some inferior twigs. At the first cutting, care must be had not to allow any part of the small twigs or side shoots to be left, but to cut them

clean off: were a part of these small shoots allowed to remain, they might produce a crop of twigs fit for wickerwork, but by no means adapted for hoops. It is better to have a few good growths for that purpose, than a profusion of inferior ones. At no period should any one stool be allowed to bear many shoots, otherwise they will be small and worthless. Every manager of willows has it in his power to increase or diminish the number of shoots on the plants under his care; for, if he take off the shoots clean by the stem of the plant, in spring, the number of shoots will be proportionally diminished in the following season." (*Plant. Kal.*, p. 533.) Rods for hoops may be cut at the end of the second or third year's growth, according to the size of the hoops wanted. In poor soil, or in plantations nearly worn out, the rods will require three years' growth to enable them to attain their proper size. "The proper season for cutting willow rods intended for hoops is any time during the month of November, immediately after the leaves have dropped. The cut should be made to within two or three buds of the place whence the shoot issued; and it should be in a sloping direction, at the back of the uppermost bud left on the bottom of the shoot on the stool. In cutting hoop willows from the stools, the swell at the bottom of the shoot only should be left. This part is amply furnished with proper buds, to serve as outlets for the rising sap; so that it is unnecessary to leave so much at the bottom of those as is necessary in the case of basket willows, especially as fewer shoots are required in the present case." (*Ibid.*, p. 534.) We agree with Sang in being "decidedly hostile to the barbarous" manner in which coopers frequently cut hoops from the stools. Under the idea of preventing the hoops from being split, they hack the rods off by cutting downwards with a hand-bill; "and thus the under part left upon the stool is split into many pieces, to the manifest injury of the plant." (*Ibid.*) The duration of willow plantations grown for the hoops is considerably longer than when they are grown for basket-making; because, in consequence of the stronger shoots, and of their remaining on the stools two or three years, greater strength is thrown into the root.

The Culture of Willows for Basket-Rods. Almost all the species of willows may be grown for this purpose; but some are greatly preferable to others. The most vigorous-growing basket willow is, unquestionably, *S.* viminàlis; and it is also the sort most generally cultivated for that purpose. It has no disadvantage that we are aware of, except that in cold wet seasons, and in a moist soil, it does not always ripen the points of its shoots. *S.* rùbra, *S.* Forbyàna, *S.* decípiens, and *S.* stipulàris are excellent species, of less vigorous growth than *S.* viminàlis, which ripen the points of their shoots perfectly in most seasons. The best of these is, perhaps, *S.* Forbyàna. *S.* triándra is nearly as vigorous as *S.* viminàlis. *S.* *H*èlix, *S.* vitellìna, and *S.* purpùrea are very desirable species, where small tough rods are required. Various other sorts might be mentioned; but these we consider as by far the most valuable. The soil for basket willows ought to be deep, well drained, and thoroughly prepared; and the situation ought to be low, level, and naturally moist; and, if there is a command of water for irrigation, so much the better. "There are few soils," Sang observes, "that will not bear willows; yet some situations are very unfit for them. Dry and exposed grounds, peat moss, and land covered with standing water, or a quagmire, are not at all suitable. Hollows, the soil of which is composed of rich, soft, earthy particles, and which can be laid dry, are the most eligible for converting into osieries; and, if such can be occasionally soaked with water during the dry months in summer, the situation may be considered perfect. Completely draining the site of a basket willow plantation is the first step towards its formation, and the foundation of its prosperity, and, consequently, of the profit to be derived from it. Drains, in any soil which is to be occupied with a permanent crop of trees, should be constructed upon principles of durability. If the drains be what are called rubble drains, the interstices will soon be filled up with the fibres of the willow roots, which will creep down

to imbibe the oozing water. They ought, therefore, either to be open drains, or drains built on the sides, and covered over with flags, to prevent their being choked up with the roots. A variety of cases may, however, occur, where it will be impossible to form covered drains; or where, perhaps, the expense might operate as a prohibition to doing so with the view of planting willows. In such cases, the ground may be formed into beds of a less or greater size, according to circumstances, by open cuts, or drains, of a sufficient width and depth to keep the soil dry. These open drains will require to be cleaned out every autumn and spring; and the cleanings may be scattered over the general surface of the beds. In preparing ground for an osier plantation, if the soil be poor, it should be as well dressed with dung as if it were intended for a crop of wheat or barley. The manure most proper for willows is stable dung." (*Plant. Kal.*, p. 526.) Sang "tried lime as a manure for willows, but found the twigs much fired, or spotted, with a sort of canker; and, in attempting to bend them, they readily broke over at the cankered place. Indeed, if a plantation of osiers be formed previously to a thorough preparation of the soil for the reception of the plants, the saving of the first expense will be found a most severe loss in the end, by the diminution of the crop in the succeeding seasons. In no case should a plantation of willows be attempted, but in prepared ground; except, perhaps, where a few rows may be introduced upon the very brink of a river, or on the top of the banks of ditches, which form, in many instances, the barrier of the waters, where the soil can scarcely be dug or otherwise ameliorated. Nothing can be farther from being good management than planting the truncheons in grass land, and allowing the sward to remain green under, or among the crop. Having fixed upon the spot, and having also carefully prepared the ground, the next step is to procure plants. These should be of the last year's wood, or of shoots of one year old, taken from the under end of well-ripened shoots of good size, and cut in a slanting direction, with a sharp knife; and they should be in lengths of 1 ft. or 1 ft. 4 in. Every vigorous shoot will afford two or three plants. The upper end, as far as it appears soft, being unripe, should be discarded; because such wood will only produce weak plants, and will not make such good roots the first season, as the firmer parts of the shoots will do. Pieces of two-years-old shoots of the same length, and cut in the same manner, may also be used; but these are more expensive, and not better for the purpose, than the former. The distances at which osiers for baskets or wickerwork ought to be planted are 18 in. between the rows, and 12 in. apart in the rows. This distance will not be too thick for at least five or six years; but, after that period, every alternate plant should be stubbed up; which will leave those remaining at 2 ft. apart in the rows." (*Ibid.*, p. 529.) "Osier plantations," Sang continues, "must be carefully hoed and cleaned every year. Nothing contributes more to the raising of a good crop of twigs, after due preparation of the soil, than keeping it and the plants clean. The stools should be carefully attended to annually, from the first year of producing a crop of twigs, in order to keep them clear of rotten stumps, and not to allow them to be overcrowded at the bottoms of the shoots. When these have become too numerous, they should be carefully thinned out, and also cut down, leaving only an eye or two at the bottom of each, until they be diminished to such a number as the stool is capable of supporting with vigour throughout the season. A basket-maker finds more service from one shoot of 6 ft. or 8 ft. in length, than from four of 3 ft. in length; and one of the first dimensions will not exhaust the stool or the land so much as four of the others. The proper season for cleaning and thinning the stocks is from the 1st of March to the middle of April." (*Ibid.*, p. 530.) The rationale of choosing this season for the operation of cleaning the plants is, that, if it were performed in the autumn, the germs of the buds existing at the base of the small shoots cleaned off would swell in the course of the winter, and be liable to throw out shoots in the following spring; whereas, by delaying the cutting off of these till the sap is in motion, the germs remain dormant, the

whole current of the sap being taken up by the buds already fully formed. "The cleaning of the plants," Sang continues, "is done with a sharp knife; and, if it has been regularly attended to from the establishment of the plantation, it is neither troublesome nor expensive: indeed, this care is necessary, were it only for keeping the plants free from destructive insects. The shoots should not be cut till the second autumn after planting; for, by being allowed to remain uncut for such a length of time, the stools become stronger and more able to produce a good crop, than if cut at an earlier period. Indeed, by the third autumn after planting, under the above management, the crop will be of very considerable value." (*Ibid.*, p. 332.)

Cutting. The proper season for cutting basket willows is the autumn, immediately after the fall of the leaf. The advantage of cutting at this season is, that the buds which are left to produce the shoots for the succeeding crop immediately begin to swell, and grow in strength during the winter; and, consequently, they make much earlier and stronger shoots in the following spring. Immediately after cutting the rods, they are tied up in bundles, each generally about 3 ft. 9 in. in girt, and if they are not intended to be used green, that is with the bark on, they are set on their thick ends in standing water, to the depth of 3 in. or 4 in. Here they remain during winter and spring, till the shoots begin to sprout, which generally happens, in the neighbourhood of London, about the end of February, when they are ready to be peeled. Sometimes it happens that osiers are cut with the leaves on, in which case they should never be tied up in bundles, on account of the fermentation that would be produced by binding them closely together in that state; but the rods should be set up thinly and loosely on end, their tops leaning against a rod supported on two props.

In Cambridgeshire, when a basket-maker purchases green rods, he measures the bundles, or bolts, as they are termed, by a band an ell long (1¼ yard, or 3 ft. 9 in.); which band, previously to tying it round the rods, he marks at the point to which the given length extends: with this he binds the bundle as soon as it appears large enough to fill the band, and afterwards completes the bundle by pushing under the band as many rods as he can. For this purpose, the large rods are laid aside, from their filling up the given space more quickly than the smaller ones; and all the rods must be laid parallel to one another in the bundle. Three bands are bound round each bundle; viz. one towards each extremity, and the third in the middle. The one nearest the lower end, which should be at the distance of 1 ft. 6 in. from the bottom, is the measuring band. In forming their bundles, basket-makers tie up a small armful (which they call a calf), and place it in the middle of the bottom of the bundle, so that the ends extend about 1 ft. beyond the bottom, and tie it up in this state. By lifting up the bundle a few times, and letting it fall on its base to the ground, the calf is driven up, and, acting as a wedge, tightens the bundle. A machine called a dumb-boy, made of wood and rope, is used by some purchasers for compressing the greatest possible number of rods into a bundle. Another machine, called a cow, which is made of iron, has a still greater power of compression than the dumb-boy. The usual price for common green osiers, in Cambridgeshire and Suffolk, is 1*s.* 6*d.* per bundle. About London, the bundles are of the same size, and the price varies from 2*s.* to 3*s.* per bundle.

The Operation of Peeling is very simple, and is commonly done by infirm or old men or women, at so much a bundle. The apparatus for peeling consists of two round rods of iron, nearly ½ in. thick, 1 ft. 4 in. long, and tapering a little upwards, welded together, at the one end which is sharpened, so that the instrument may be easily thrust down into the ground. When the instrument is inserted in a piece of firm ground, the peeler sits down opposite to it, takes the willow rod or twig in his right hand by the small end, and puts a foot or more of the thick end into the instrument, the prongs of which he presses together with his left hand, while with his right he draws the willow towards him; by which operation the bark will at once be separated from the wood: the small end is then treated in the same manner, and the peeling is

completed. (*Sang.*) Another mode is, to fix a plank on legs at a convenient height, so as to form a stool, or small bench, having holes bored in it with an inch auger: into these is put a stick, the upper end of which is cleft; and through this cleft the willow twigs are drawn, to separate them from the bark, in the same manner as through the iron rods. (*Mitch. Dend.*, p. 60.) After being peeled, the rods will keep in good condition for a long time, till a proper market is found for them. It may be useful here to remark, that osiers in the peeled state will keep better to wait a market, than if left with the bark on; and that they never fail to produce a greater return in the peeled state, after paying for the labour of peeling, than they do when sold immediately after they are cut from the stools. (*Plant. Kal.*, p. 534.)

Whitened, or peeled, rods are tied up in bundles, the band of which is 3 ft. 6 in. long, and sold, about London, at from 5*s.* to 7*s* per bolt, or bundle. The rods which have the best sale in the London market are those of *S.* triándra. Green rods are sold by the score bolts, and whitened rods are sold by the load of 80 bolts. In Covent Garden Market, in and around which there are several basket-makers, the rods of *S.* viminàlis are by far the largest brought to market; and, whether with or without the bark on, to them is exclusively applied the term osiers. All the other kinds of willow rods are exclusively termed willows; and those most frequently exposed for sale, with the bark on, are *S.* decípiens and *S.* triándra. All the larger baskets, and all the hampers, are made of the rods of *S.* viminàlis. In Germany, and also frequently in Scotland, the willows, after being cut and tied up in bolts, are stacked, or kept in an airy shed; and, when the bark is to be removed, it is effected by boiling or steaming them. The rods, thus prepared, are considered to be rather more durable than when the bark is separated in consequence of the rising of the sap; and they may be used immediately after cutting, instead of remaining in a useless state for several months.

Basket-making, in the commonest form of the manufacture, is a very simple operation; and in most parts of Europe it was formerly understood by every country labourer, and practised by him for himself or his master, as it still is in Russia, Sweden, and other countries of the north. In Britain, and especially in Scotland, it was the custom, some years ago, for every gardener to understand basket-making, and it generally formed a part of his occupation in the winter evenings; but this is no longer the case: gardening is now become a more intellectual occupation, and the rising generation of gardeners are obliged to spend their evenings, and every spare moment, in reading. Still, we think that every gardener, forester, and woodman ought to know how to make a common garden basket, and more especially those wicker-work structures which are now in very general use for the protection of half-hardy trees and shrubs, when young, and planted out in the open garden. These wicker structures are formed on the familiar principle of wattling a hurdle or wickerwork fence, and, therefore, we shall not enter into details respecting them in this place, but refer our readers to the *Gard. Mag.*, vol. xiii., in which they will find a copious article, illustrated by engravings, on the fabrication of wickerwork for garden purposes. We shall here confine ourselves to giving a slight outline of garden basket making, as practised in Scotland and Germany, by gardeners.

Every basket, according to the Scotch and German mode of construction, consists of two parts; the main ribs, or principal parts of the framework of the structure; and the filling in, or wattled part, or web. The principal ribs, in common baskets of a roundish form, are two: a vertical rib, or hoop, the upper part of which is destined to form the handle; and a horizontal hoop, or rim, which is destined to support all the subordinate ribs, on which the wands are wattled. The two main ribs are first bent to the required form, and made fast at their extremities by nails or wire. They are then joined together in their proper position, the one intersecting the other; and they are afterwards nailed together, or tied by wire, at the points of intersection. The operation of wattling is next commenced, by taking the

small end of a wand, and passing it once or twice round the cross formed by the points of intersection; after which one, or perhaps two, secondary ribs are introduced on each side of the vertical main rib. The wattling is then proceeded with a little farther, when two or more secondary ribs are introduced; and this process is continued till a sufficient number of subordinate ribs are put in to support the wattling of the entire structure. For coarse baskets, wattled with rods having the bark on, the distance of 3 in. or 4 in. between the subordinate ribs, at the widest part, will be sufficient; but for baskets made of peeled rods, even of the largest size, 4 in. are rather too much. When the form of the basket is a square or a parallelogram, exactly the same process is pursued; but greater care and skill are required in bending both the main ribs and the subordinate ribs to the required forms. To facilitate this, the rods which are to form the main ribs, and also those for the secondary ribs, are split up the middle; and, to render it easier to bend them, they are steeped for some hours in cold water. The rods intended for the subordinate ribs are sometimes split into four parts; and, in bending both the main and the subordinate ribs, the pith is always kept inwards, so that the outer side presents a smooth surface. When the rods are to be split in two, a common knife is made use of; but when they are to be split into three or more parts, a piece of hard wood, 7 in. or 8 in. long, and about 1 in. in diameter, and cut so as to present three or four sharp edges radiating from its centre, called a cleaver, is made use of. The knife being entered at the thick end of the rod, so as to split it into three or four parts for the length of 1 in., the split part is entered on the cleaver, and drawn against it till the whole rod is split from one end to the other. This process is more simple, rapid, and easy in the execution, than in the description.

Another Scotch mode of forming baskets and small hampers is, by commencing at the centre of what is to form the bottom, and working from that outwards, and, after the bottom is completed, upwards. In proceeding according to this mode, two ribs, or larger wands, are laid on the floor, crossing each other at right angles; and one or two small wands are woven round them, as a nucleus in which to insert the end of other ribs. These ribs, it is evident, may be increased in number, and extended in direction, at pleasure, so as either to make the bottom of the basket circular, oval, or right-angled. When the work is completed as far as the sides, the ribs are turned upwards, and the work continued in a perpendicular direction as high as required; when a horizontal rod, or rim, can be introduced, and made fast to the upright rods by wattling. If a handle is wanted, it can readily be added.

The English mode of basket-making, which is in many respects easier than the Scotch and German mode, is effected by means of willow rods of one year's growth alone; whereas the Scotch mode requires the addition of rods of two years' growth for the handles, rims, and ribs; and, in the case of all baskets intended to be tolerably strong, of rods, for these purposes, of a tough and more durable kind of wood, such as ash, oak, hazel, &c. By the English mode, the workman begins on the floor, on which he lays two, three, or more rods, but commonly three, parallel to and touching each other, and cut to the length of the diameter of the bottom of the basket. On these three rods are placed other three, parallel to and touching each other at right angles, cut also to the length of the diameter of the bottom of the basket. The operator now puts his foot on the centre of intersection of the six rods, and begins to make the rods fast there, by interweaving, or wattling, round them, with small rods. As he proceeds with his interweaving, he frequently turns round the skeleton bottom, under his foot, spreading out the rods which form the ribs, so that their extremities, after two or three courses of wands have been woven in, are at equal distances from each other in the circumference of what is to form the bottom of the basket, like the spokes of a wheel. The weaving being carried on to the full extent of the bottom, the latter is now turned upside down, and, the points of the radiating ribs being cut off, a willow rod is inserted

on each side of each rib, and turned upwards; the whole being kept in an upright position by being bound slightly together at their upper extremities. Rods are now interwoven between these upright rods, as high as required for the depth of the basket; after which the rods are loosened at the top, and their ends brought down and plaited into an edge or brim, which, as we have before observed with regard to splitting the willows, is an operation much more easily and rapidly performed than described. A small round basket or hamper is now produced, like those in which potatoes are exposed for sale in the London markets, and to this a handle may be added by inserting in the interwoven part of the sides two or three rods close together, at opposite points of the rim, pushing them down to near the bottom, and plaiting their upper ends together so as to form a handle. A handle is also sometimes made by forcing down the ends of a thick rod, in the woven work, before the rim is completed; and plaiting round it two or more of the ends of the rods which form the ribs from each side. The durability of the Scotch basket is much greater than that of the English one; not only on account of the greater durability of the handle and ribs, but, in the case of peeled rods, by the bark being loosened by boiling, instead of by the rising of the sap.

Both modes of basket-making will readily be understood from the following figures:—

1277

1278

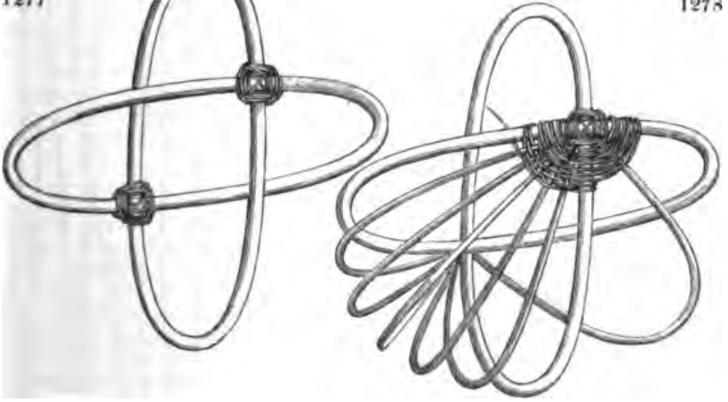


Fig. 1277. shows the handle and rim of the commonest form of Scotch basket, made fast at the points of intersection.

Fig. 1278. shows the same skeleton, with the ribs of one side added, and the wattling, or woven work, commenced.

1279

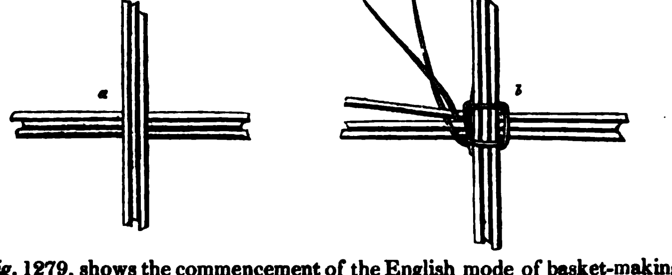
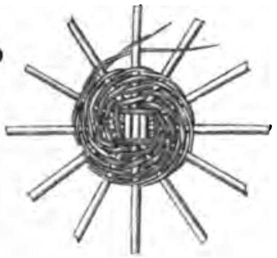


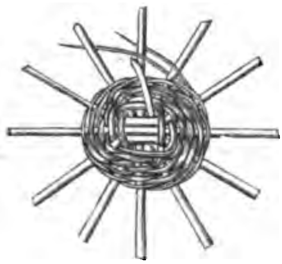
Fig. 1279. shows the commencement of the English mode of basket-making; in which *a* represents the six rods that are to form the bottom of the basket,

laid down crossing each other at right angles; and *b* the second stage, in which the rods are made fast by the commencement of the weaving process.

Figs. 1280. and 1281. show the progress of weaving the bottom; the latter being what ultimately becomes the under side, and the former the upper side.

1280





1281

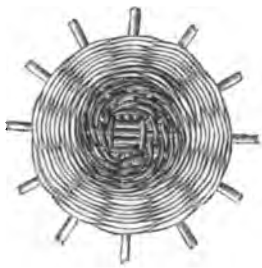
Fig. 1282. shows the bottom complete, the under side of it being uppermost.

Fig. 1283. shows the bottom turned upside down, the points of some of the radiating ribs cut off; some of the rods which are to form the side ribs inserted; and the side weaving commenced, as indicated by the four rods at *c*.

Fig. 1284. shows the basket nearly completed, with part of the rim finished, and the rod on which the handle is to be placed inserted.

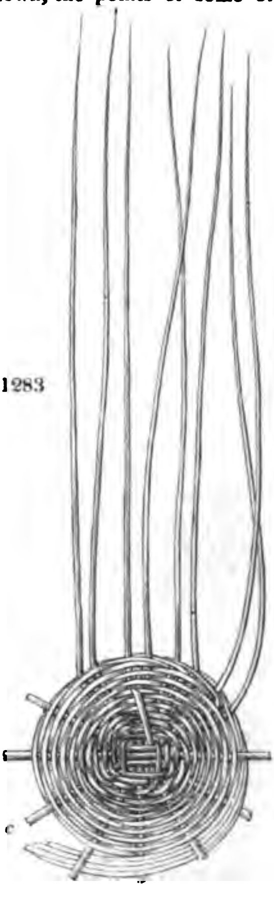
Fig. 1285. shows the rim completed, and part of the handle plaited.

These details will be sufficient to enable every gardener or woodman to form a common



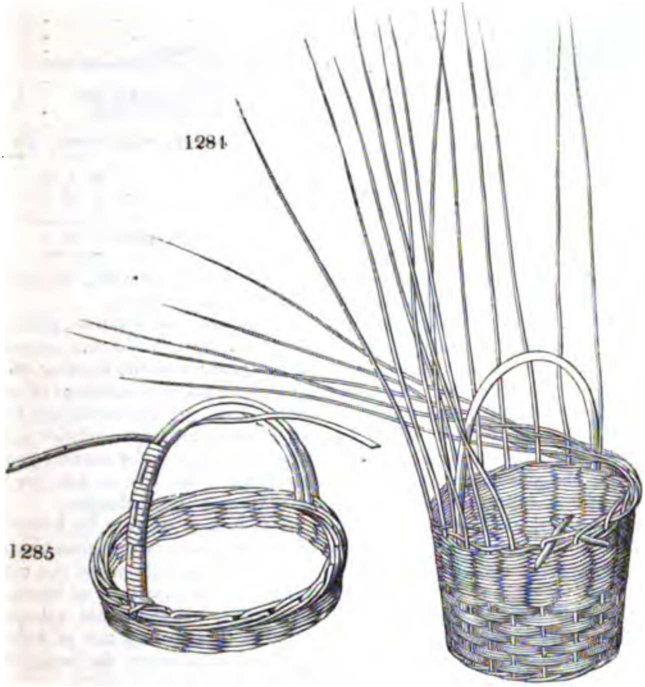
1282

1283



coarse basket, which, we think, is all that, in the present state of the division of labour, can be required of him. Those who are desirous of farther information on this subject may consult our article already referred to, in the *Gard. Mag.*, vol. xiii., or the *Encyclopædia Britannica*, ed. 1836; or, if they have an opportunity, spend an hour or two in the manufactory of an extensive basket-maker.

Baskets made of peeled rods, when completed, are washed with clean water, and afterwards put into a close room, and bleached by the vapour of sulphur. A small iron vessel is made red-hot, and set in the centre of the room, which is filled with baskets piled up all round the sides of the room. A lump of



1284

1285

sulphur ($1\frac{1}{4}$ lb. is sufficient for a room 10 ft. on every side, and 10 ft. high) is then dropped into the iron vessel, and the operator instantly leaves the room, shutting it close, and leaving it for ten or twelve hours, generally all night. The chemical explanation of the mode in which the sulphureous gas generated operates has not, we are informed by chemists, been yet satisfactorily given. Some kinds of osiers whiten much better than others. One of the best for this purpose is *S. amygdálina*; next, *S. triándra*, and *S. decípiens*; and the worst is *S. Forbyàna*, the rods of which cannot be whitened at all.

Profit of a Plantation of Osiers for Wickerwork or Basketwork. — Much has been said of the great profit to be obtained from a plantation of willows for hoops or basket-making; on which, as in all similar cases, it may be observed, that extraordinary care, in the case of any crop whatever, will be attended with extraordinary produce; and that, wherever there is extraordinary profit without extraordinary care, there must be extraordinary risk. This last is the case with willow plantations, in common with those of the hop, of rape for seed, and of various other crops. Mitchell quaintly remarks that, where a quantity of land is planted with basket willows, "a man will do well to make a net profit of 10*l.* per acre; for the plants are very subject to the depredations of insects." In the *Transactions of the Society for the Encouragement of Arts*, vol. xxiii., for 1805, an account is given of a plantation of seven acres, made in the fen lands of Ely, from which we extract the following details: — The land was cast into beds 12 ft. wide, and raised 18 in. higher than the general surface, by the earth taken out of the intervening open drains. Fourteen thousand sets were planted per acre, and the following is an account of the result:—

First Cost per Acre.

	£	s.	d.
Forming the bed - - - - -	12	0	0
14,000 sets, at 1*l.* per 1000 - -	14	0	0
Planting, at 3*s.* per 1000 - - -	2	2	0
Weeding twice the first season -	0	16	0
Total cost the first year	£28	18	0

Annual Expense per Acre.

	£	s.	d.
Rent - - - - - - - -	0	10	0
Weeding - - - - - -	0	16	0
Parish rates and fences - - -	0	10	0
Cutting the rods, at 3*s.* per score bundles of 45 in. girt - - - -	1	4	0
Interest of 28*l.* 18*s.*, the first cost -	1	9	0
Annual filling up of casualties - -	0	6	0
Total expense per annum	£4	15	0

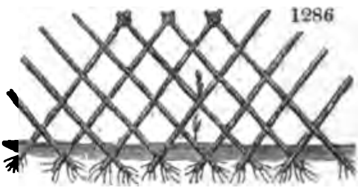
Produce.

	£	s.	d
Annual value of 160 bundles of rods, at 1*s.* 4*d.* - - - -	10	13	0
Total expense per annum - - - - - -	4	15	0
Net profit	5	18	0

The additional expense of peeling would be about 4*l.* per acre; but the rods peeled would have sold at a much higher price in proportion.

In vol. xxiv. of the same work, an account is given of a willow plantation in Suffolk, in which the ground was ploughed and harrowed; the expense of which, and of planting the sets, was 2*l.* 2*s.* per acre; and the number of sets planted was 12,000 per acre, which cost 10*l.* The price of cuttings of osiers, in Cambridgeshire, in 1826, was, for *S.* viminàlis, 8*s.* per thousand, and for the less common kinds, 10*s.* or 12*s.* per thousand. Sang mentions inferior soils in Scotland, which have produced from 25*l.* to 30*l.* per acre for several years in succession; the annual expense of cleaning being from 25*s.* to 35*s.* per acre, exclusive of cutting, rent, interest of prime cost, and other charges.

Culture of the Willow for Hedges.—The best kinds of willows for hedges are those which belong to *S.* càprea, because the young shoots of these kinds are most rigid, and are certain of annually ripening their wood; while the catkins are the most valuable of all others for bees; and the clippings, or trimmings, which should be cut off in August or September, are the most valuable of willow fodder for horses and cattle. Add, also, that this species of willow is one of the most durable and woody kinds, and that when the hedge is cut down it will reproduce itself the same season; and, with a little assistance from art, become a fence the season following.



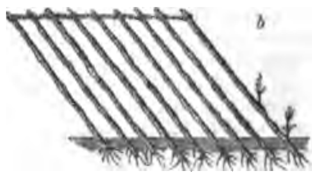
1286

Fences of live Willow are, in some cases, formed by inserting rods of two years' growth, such as are used for making hoops, reduced to the length of 6 ft.; and 1 ft. or 1 ft. 6 in. being inserted in the soil, a fence is at once produced 4 ft. 6 in. in height. These rods may either be inserted in a vertical direction parallel to each other, and 6 in. or 8 in. asunder, as in *fig.* 1287. *a*; in a sloping direction parallel to each other, as in *fig.* 1287. *b*; or crossing each other at right angles, as in *fig.* 1286. In the latter case, the rods require, in order to make a fence



a

1287



b

5 ft. 6 in. high, to be cut to the length of 7 ft. or 8 ft.; but a fence so formed has this advantage, that the rods may be much farther apart than when they are placed either vertically or sloping, and parallel to each other. In the two latter cases, also, a top rod, or rail, is required to unite the ends of the parallel rods:

but this horizontal rod may be dispensed with where the rods are planted crossing each other; as, when that is the case, each is kept in its place by a single tie at any point of intersection near the top of the fence. The advantage of placing the rods either sloping or intersecting is, that they push equally throughout; whereas, when placed perpendicularly, they push chiefly at the summit. The durability of fences of this description depends entirely on their management; on suffering no one rod, or plant, to grow more vigorously than another; and cutting the hedge regularly every year, either in summer for the leaves as fodder, or in November for the twigs for basket-making; and in keeping the base of the hedge at least twice the width of the top.

Culture of Willows as ornamental Trees or Shrubs. It is almost needless to repeat what we have before stated on the subject of rendering trees and shrubs either gardenesque, or picturesque, according to the character of the scene in which they are to be placed. As gardenesque objects, all the shrubs, as well as the trees, will have most effect when trained to a single stem, if only to the height of 2 ft. or 3 ft. This alone gives them the character of art. All the trailing sorts, such as *S.* herbàcea, *S.* reticulàta, &c., to be truly gardenesque, ought to be grafted standard high, for the same reason. For picturesque decoration in artificial scenery, all the upright shrubby and tree willows may be scattered or grouped along the margin of water; and all the creeping or trailing kinds placed on rockwork, and left to take their natural shapes. Such species of willow as *S.* pentándra, *S.* lùcida, and one or two others, from having little of the aspect common to the willow family, and, consequently, their forms not being associated with the idea of moist soil or water, may be placed near a house, or in a shrubbery or flower-garden, on account of their fragrance and early blossoms: but this cannot be recommended with respect to willows in general, which always convey the idea of the vicinity of water, or of marshy ground.

A Salictum is the only scene in which a complete collection of willows can be displayed to advantage; because, as we have already observed, willows are not trees that will associate well with any other kinds. We would by no means recommend a salictum to be formed along the margin of water where the plants can be seen only on one side; unless, indeed, the object were to form picturesque scenery. In this case, the plants may be grouped in various ways; some on the margin of water, others on the open lawn, and some on rocks, banks, and stony places. A salictum where the object is to preserve as much as possible the indigenous characters of the kinds, ought to contain various surfaces and kinds of soil; and be wholly aquatic in some places, and rocky, gravelly, sandy, or arid, in others. Such a salictum is admirably adapted for hilly countries; and, as almost all the willows are natives of cold climates, a salictum of this kind would be a scene particularly suitable for the north of Scotland. A gardenesque salictum is that which would produce most effect in a fertile and level country; and, if water is at command, it may either be conducted in drains under the surface, for the purpose of irrigation at pleasure; or it may appear in a canal, surrounding the salictum, and assuming a gardenesque or artistical form; or in a geometrical or gardenesque pond in the centre. In such a salictum, all the plants ought to be placed singly, with an ample space between them to allow each to attain its natural size and shape. The creeping and trailing sorts ought also to be planted singly, and allowed free space to extend themselves on every side; because, here, the object being more to display botanical character in a gardenesque manner than to exhibit the curious gardenesque, it would hardly be proper to graft the creeping and trailing sorts standard high, so as to make trees totally different from any ever seen in nature.

As all the species of *S*àlix flower in early spring, or from the beginning of March to the middle of June, and as the flowers are, in the daytime when the sun shines, covered with bees, the salictum is one of the most cheerful and inviting of garden scenes after the gloom of winter has passed away. For this reason, it is desirable that the soil of the salictum should be dry at

that season, in order that the walks may be used without the risk of damping the feet. For the same reason, also, when it can be accomplished, the salictum should not be at any great distance from the shrubbery or the flower-garden. Let us suppose a collection of a hundred sorts of willows, planted in good soil, with sufficient room to assume their natural sizes and shapes; that the plants have been ten years planted; and that they are all in flower, or coming into flower; and we shall readily imagine that a scene of so much of a particular kind of beauty and splendour has never yet been presented to the botanist or the lover of gardening. For such a salictum, two or three acres would be requisite; but these, we should think, might easily be spared in the parks of wealthy proprietors in England, or in the grounds of gentlemen having residences in the mountainous districts of Wales and Scotland.

Accidents, Diseases, and Insects. The willow is subject to few accidents or diseases; but it is liable to be attacked by many insects. *S*àlix frágilis Mathew states to be subject, in Scotland, to a disease similar to what the canker is in the apple tree. This disease, he says, is generally concentrated in certain parts of the bark and alburnum of the trunk; a portion of the branches above which withers, and the uppermost boughs, after a time, assume the appearance of a stag's head and horns; which, from the indestructibility of these dead branches, the tree retains for many years; and hence the name of stag's-head osier, which is applied to this species. This disease, and other causes, especially in old trees, give rise to rottenness in the trunk; which, in the willow, from its being comparatively a short-lived tree, takes place, more especially in wet soils, much sooner than in most other species. Mr. Sang mentions (*Kal.*, p. 527.), that he found lime produce canker in the twigs of basket willows; so that, when he attempted to bend them, they broke short off at the cankered place. (See p. 1469.)

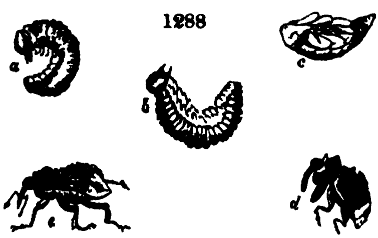
One of the earliest notices of insects injurious to willows is given by Mr. William Curtis, in vol. i. of the *Linnæan Transactions*, published in 1791. This article we consider so interesting and instructive, that we shall here give it almost entire. It was read before the Linnæan Society in November, 1788: — "Several species of willow, particularly three of the most useful and ornamental, the *S.* álba, the *S.* frágilis, and the *S.* babylónica, are well known to be subject to the depredations of numerous insects, and of the larvæ of the *C*óssus Lignipérda (already described as attacking the elm, see p. 1386.) in particular, which feed on the substance of the wood, and prove uncommonly destructive to the latter species; for, as the larvæ in each tree are generally numerous, in the course of a few years they destroy so much of the trunk, that the first violent gale of wind blows down the tree. So infested are the weeping willows, in many nurseries, with these insects, that scarcely one in ten can be selected free from them." The willows are infested, also, in the same way by the larvæ of the *C*erámbyx moschàtus; and also by those of a species of the *C*urculiónidæ, which was little suspected of committing similar depredations, but which, in proportion to its size, is no less destructive than those of the *C*erámbyx and *C*óssus. The larvæ of a species of Nitídula [*S*ílpha *L.*] are also found to be injurious in a similar manner to those above named.

In the beginning of June, 1780, Mr. Curtis observed a young tree of the *S*àlix viminàlis, which had been planted in his garden two years, and which was about 6 in. in diameter, throwing out from various parts of its trunk a substance somewhat resembling sawdust, which fell at its base in no inconsiderable quantity. This substance, on a closer examination, was found to proceed from holes about the size of a goose-quill, penetrating deeply into the substance of the wood, obliquely upwards and downwards. On its first coming out, it appeared of the colour of the wood, and was moist; and as it grew dry it became of a browner colour. The whole of the trunk where this internal operation was going forward emitted a smell somewhat like beer in a state of fermentation; and various insects, allured thereby, settled on the tree, and seemed eagerly to imbibe nourishment from it: among others, the Vanéssa Atalánta, Cetònia auràta, *A*'pis mellífica, *C*ántharis [Teléphorus] lívida, with

various species of *Múscæ*, were frequent attendants. On the 10th of June, Mr. Curtis took the *Cerámbyx* moschàtus on the trunk, but saw only one.

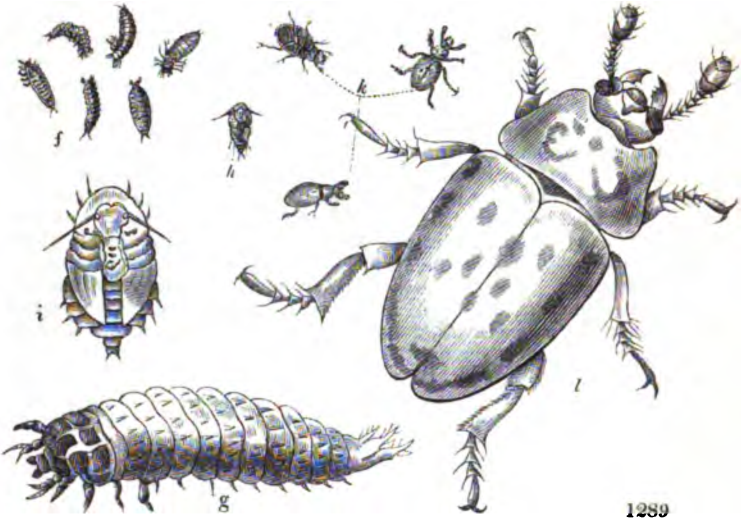
"These extraordinary appearances," Mr. Curtis continues, "strangely excited my curiosity; I therefore often visited the tree, and, on minutely examining its bark, I discovered several small coleopterous insects in its crevices, which at first, from their great similitude, I mistook for the *Címex* lectulàrius: a more close inspection, however, soon convinced me that it was *Sílpha* grísea [Nitídula grísea *Fab.*, *&c.*]. On examining the sawdust-like substance in its moist and fermenting state, I discovered many small larvæ feeding amongst it, which, when fully grown, were about a barleycorn in length; the body somewhat flattened, of a dirty white colour, having 6 fore feet and 2 hind ones; the head of a brightish brown colour, furnished with two jaws; each joint of the body projecting at the sides, so as to give it a kind of serrated appearance; the neck of a blackish brown colour, with two or more rows of small dots running therefrom down the back to the tail, which was terminated by four small setæ, turning a little upwards, the two lowermost by much the longest. The larvæ were generally found in considerable numbers together, and, on being disturbed, ran pretty briskly. From their size, and other concurring circumstances, I had no doubt but they were the larvæ of the *Sílpha* grísea, feeding on the spoils of the tree's grand internal enemy, *Cóssus* Lignipérda." Mr. Curtis, being determined to get a sight of the N. grísea, with a hatchet chopped out a piece of the tree, sufficient for the discovery; when the large maggots represented in *fig.* 1288. at *a*, *b*, were found in perpendicularly cylindrical cavities, corroding the substance of the wood: they were about twice or thrice as large as the maggot of the hazel nut, and very much resembling it in shape; of a yellowish white colour, gross body, apparently without any legs, having a shining head of a chestnut colour, armed with strong jaws.

1288



On the 25th of July, cutting out a piece more of the tree, Mr. Curtis "discovered several *Sílphæ* [Nitídulæ] as represented in *fig.* 1289.; and, at the same time, found on the bark of the tree the *Curcùlio* [Cryptorhýnchus *Illig.*] lápathi (*fig.* 1288. *d*, *e*); and, on cutting further into the tree, found the same species just broken forth from its pupa (*c*)." Mr. Curtis "was then satisfied that all the mischief which had been done to the tree was effected by this species of *Curculiónidæ*," viz. *C.* lápathi (*d*, *e*); and which he "had some years before found in great plenty on the leaves of the same species of *Sàlix*," viz. *S.* viminàlis. Having succeeded in discovering the principal circumstances of the history of this insect, Mr. Curtis was not a little anxious to find the Nitídula in its pupa state; and, after searching for it in vain on, and under, the bark of the tree, "I found," he says, "plenty of them under the surface of the ground, among the moist earth and sawdust, and several, also, of the same insect in its perfect state. I had no opportunity of observing in what manner the female *Curcùlio* lápathi deposited her eggs: most probably they are laid under the bark at first, or in some crack or crevice of the tree, arising from an injury; at least, that is the mode in which the female *Cóssus* Lignipérda deposits its eggs, and to prevent which, we cannot be too much on our guard; for, if the larvæ have once entered the tree, we shall in vain seek a remedy. If the tree, therefore, sustain any injury from lopping, or from any other cause, a piece of canvass, spread over with some adhesive resinous substance, should be applied to the wound; or the nurseryman may find his account in matting over the bodies of his young trees during the months of June and July, when the moth comes out of its chrysalis; or,

perhaps, brushing them over at that period with some coal tar" may, by its smell, which is known to be offensive to all insects, deter any from settling on the trees for some days or weeks. In *fig.* 1289., *f* shows the larvæ of Nitídula



1289

grísea; *g*, one of the same larvæ magnified; *h*, the pupa of the Nitídula grísea; *i*, the pupa magnified; *k*, the perfect insects; and *l*, the perfect insect magnified. (*Lin. Trans.*, vol. i. p. 89.)

Cryptorhýnchus lápathi is exceedingly abundant in the osier beds near Barnes and Mortlake. In the perfect state, it is very sluggish, remaining nearly stationary upon the leaves and slender twigs, to which it attaches itself very firmly, by means of its broad cushioned tarsi, and probably, also, by the bent hook at the extremity of the tibiæ. Several interesting particulars are recorded relative to this species in Howitt's *Book of the Seasons.* In the late Mr. Haworth's *Review of Entomology*, published in the first part of the old *Entomological Society's Transactions*, is given an extract from the *Ashmolean Appendix* to Ray's *Historia Insectorum*, relative to the "*C*urcùlio lápathi of Linnæus, the ancient spelling of which appears to have been Gurgulio; which species was selected for two reasons; "the one, because it is a well-known insect; and the other, because, according to this ingenious author, it possesses, though feebly, the faculty of voice; which is a piece of information for which I am altogether indebted to this tract." "Lacessitus vocem quærulam dedit." The sound here alluded to is produced by the friction of the hollowed base of the thorax against the elevated front of the elytra.

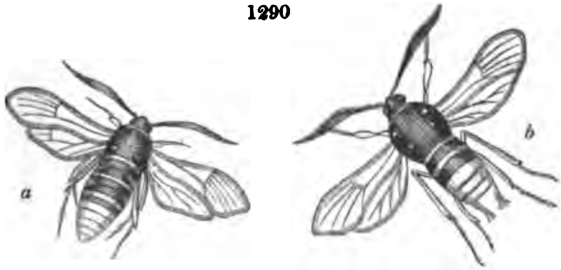
This insect, which is the *C*urcùlio lápathi of Linnæus (*Syst. Nat.*, ii. 608. 20.; Rhynchæ'nus lápathi of Fabricius, *Syst. Eleuth.*, ii. 466., and Gyllenhall and the Cryptorhýnchus lápathi of Illiger and Stephens), varies in length from $\frac{1}{3}$ in. to $\frac{1}{2}$ in. It is of an opaque dirty black colour, with the sides of the thorax, and the base and apical portion of the elytra clothed with white scales; the thorax and elytra being also ornamented with minute tufts of black scales. It feeds, also, upon the alders and sharp dock (*R*ùmex acùtus), according to Gyllenhall. Kirby and Spence, however, appear to doubt the correctness of this last habitat, considering the name lápathi to have been given to the insect by mistake; observing that, as "docks often grow under willows, the mistake in question might easily have happened." (*Introd. to Ent.*, i. p. 196. note.)

In the salictum in the Botanic Garden at Oxford, we are informed by Mr.

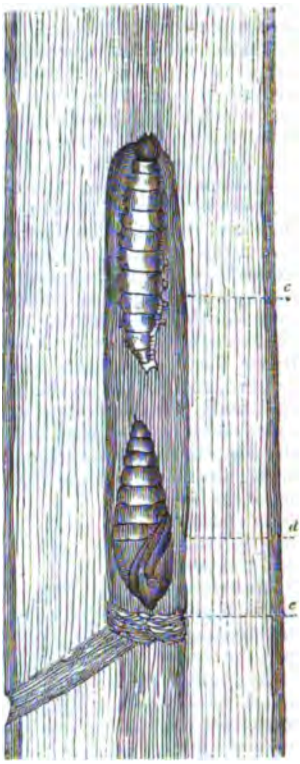
Baxter, several of the species are in some seasons almost entirely destroyed by the Cryptorhýnchus lápathi. Mr. Baxter, jun., informs us that the species of willow which are least injured by this insect are, the *S.* pentándra, *S.* decípiens, and *S.* nígricans. After the wood in the trunk of the tree is partially destroyed, it is generally found infested by the black ant (*Formìca* fuliginòsa *Latr.*), which is found, not only in the wood of the willow, but in that of other decayed trees, even in houses, living on the decayed rafters and wooden floors. In Kirby and Spence's *Entomology*, these insects are described as living in societies, and "making their habitations in the trunks of old oak or willow trees, gnawing the wood into numberless stories, more or less horizontal, the ceilings and floors of which are about five or six lines asunder, black, and as thin as card; sometimes supported by vertical partitions, forming an infinity of apartments, which communicate in some places by small apertures; and at others by light, cylindrical pillars, furnished with a base and capital, which are arrayed in colonnades, leaving a communication perfectly free throughout the whole extent of the story." (*Kirby and Spence's Introd.*, &c., i. p. 483.)

By far the most valuable species of willow in English woods, as already stated, is *S.* càprea; and on this the Trochílium crabronifórme, or lunar hornet sphinx, feeds, in its larva state, upon the living wood, by boring into the trunk, and thus destroying the tree. An account of this insect has been communicated to the *Magazine of Natural History* by the Rev. W. T. Bree, of which we give the following abstract:—"In the *Transactions of the Linnæan Society*, vol. iii. tab. i., a figure of the Trochílium crabronifórme (*fig.* 1290.), under the name of *Sphínx* crabronifórmis, is given in its three stages. Lewin, the writer of the article, gives it as his opinion that 'the caterpillar does not enter the wood till the second year of its own age;' and he states as a reason, that, 'among all the numerous larvæ he has found from June to November, he could perceive but a slight difference in size. Possibly, therefore, they may feed on the tender bark of the sallow root the first year after they are hatched.'" This, Mr. Bree thinks, is very probably the case; for he adds that he has not observed in the wood any perforations of a very small size, or such as have the appearance of having been made by caterpillars newly hatched. As the caterpillar eats its way *upwards* through the solid wood, a question may arise: How is the sphinx, when it bursts from the chrysalis, to make its escape out of the wood without injury? To obviate this difficulty, instinct directs the caterpillar, before it changes to a chrysalis, to turn its head *downwards*, so as to be opposite to the orifice, which affords a ready exit for the winged insect. A portion of the plate in the *Linnæan Transactions* above referred to is copied in *fig.* 1290.; in which *a* is the male imago, or perfect insect; *b*, the female imago: and in *fig.* 1291.; in which *c* is the larva, or caterpillar, in its proper situation, with its head upwards, in the act of feeding on the wood; *d*, the pupa, with its head downwards, preparatory to its exit; and *e*, the web closing the orifice by which the larva had entered, and by which the imago must come out. Mr. Bree sent us the butt ends of three young willow trees, which had been perforated by the insect, as shown by a view of their ends given in *fig.* 1292. One of these, on being split up, presented the appearance of *fig.* 1292. *a*; and, as it did not then include the case of the pupa, we conclude that the insect had escaped. The insect enters the stems, which it perforates near the root, and eats its way upwards for several inches, sometimes to the length

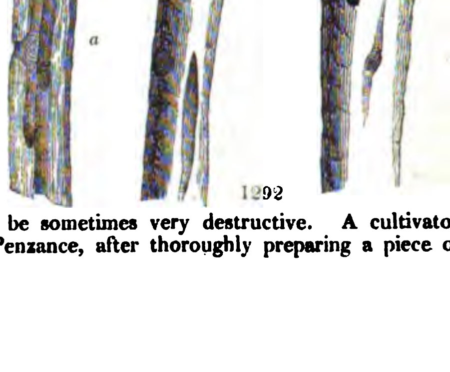
1290



of 1 ft. or more. Mr. Lewin thinks the caterpillar generally confines itself to the pith in the centre of the stem; but Mr. Bree finds the pith sometimes untouched, all the perforations being made in the solid wood between the pith and the bark. Being an internal feeder, the caterpillar, of course, is only to be found by cutting into and opening the stems of the willow in which it is enclosed. When the periodical falls of underwood take place, Mr. Bree has observed that scarcely a single willow wand is cut down that does not exhibit proofs of the ravages of this insect; sometimes three or four, or even five, separate perforations occurring in the same stem. Though the Trochílium crabronifórme is a common species, Mr. Bree has never met with an example of the winged insect at large in his neighbourhood (Allesley, near Coventry). He has bred it from the caterpillar; and once he took a single pair in an osier bed near Dudley, which, at the time, were considered as great rarities. "The wood of *Sàlix càprea* is, in Warwickshire, usually either sold to the rake-maker, for the purpose of being worked up into rake-teeth, &c.; or converted into what are called flakes, i. e. hurdles made of split stuff nailed together, in contradistinction to the common wicker hurdle, which is formed of round wood, twisted and plaited together without the help of nails. The lower, and consequently the thicker, portion of each willow rod, to the length of 5 in. or 6 in., or occasionally 1 ft. or more, is spoiled by the perforations of the larva, and rendered unavailable to the above purposes." (*Mag. Nat. Hist.*, new series, vol. i. p. 19.) Of the Trochílium crabronifórme (or, more properly T. bembecifórme) a beautiful figure is given by Mr. Curtis in the *British Entomology*, pl. 372. fig. sup.; and several additional particulars relative to its habits are given by Mr. Westwood, in an article in the third part of the *Transactions of the Entomological Society*.



1291



1292

The caterpillars of Nématus càpreæ feed on the leaves of the sallow (*S. càprea L.*), and of several species of willow and osier, to which they are said to be sometimes very destructive. A cultivator in the neighbourhood of Penzance, after thoroughly preparing a piece of

moist ground, highly favourable in itself for the growth of osiers, planted it; and, after a few years, the osiers had disappeared, he hardly knew how. It was planted a second and even a third time, and the plants always disappeared. "My attention," says the writer, "being now strongly drawn to the subject, I discovered that which I ought to have perceived half a century sooner; namely, that Nématus càpreæ, favoured by the peculiar locality, was the cause of all this devastation. The spot is low, moist, shut in by wood, and very near the southern limit of England. The species of willow planted was chiefly one of those with broad leaves, woolly underneath (probably *S.* càprea *L.*). The warmth of the situation, and the nidus for eggs afforded by these woolly leaves, were, I presume, the combined cause of the insect being so remarkably attracted to this spot. Some of the plants were of a species with smooth narrow leaves (probably *S.* triándra *L.*): these escaped much longer than the others, but still they did not escape eventually, as they were also attacked by another caterpillar. I introduced both red and black ants, and put some of the caterpillars into their nests; but the ants disregarded them altogether. Having, although thus slowly, ascertained the true state of things, the ground was once more cultivated, and was planted with apple trees. As there happens to be no insect there which much attacks these, they thrive very well. The distance at which apple trees are planted is, also, less favourable to the propagation of vermin. I have communicated all this detail in order to show the importance to individuals of attending to such seemingly trifling matters. Many a plantation, &c., fails in an apparently inexplicable manner. A scientific investigation would, in numerous cases, disclose the truth, and prevent farther loss. Had a person acquainted with entomology been proprietor of this osier ground 50 years since, he would speedily have discovered the truth, and might have saved 200*l.* or more to himself and his successors." (*Mag. Nat. Hist.*, vii. p. 423.)

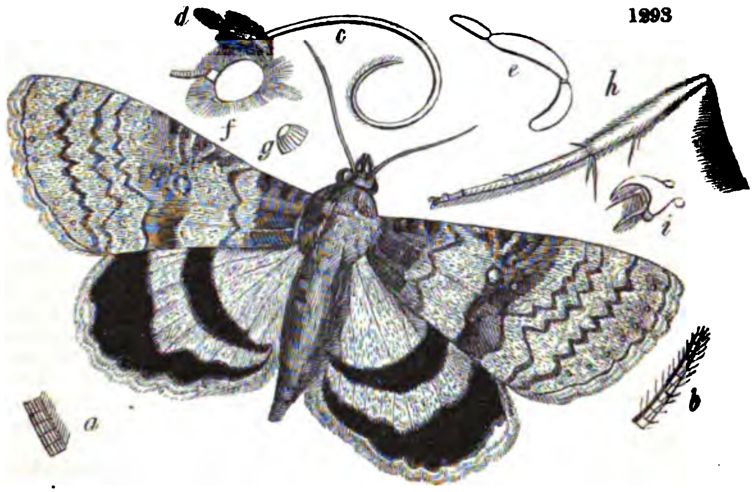
The Chrysomèla (Phæ`do*n*) vulgatíssima *L.* is another species which is occasionally injurious to one of the narrow-leaved species of willow. This is a pretty little insect, of a shining blue or green colour, and of an oblong-oval form, about ¼ in. in length, which is found, during the winter months, in great profusion under the loose bark of willows, growing in damp localities. It deposits its eggs upon the young leaves; and the larvæ, when hatched, form little associations, feeding together in regular rows, the heads of the second row touching the tails of the first. In this manner they proceed from the base to the extremity of the leaf, which they soon strip of its parenchyma. They then attack the next leaf; and so on, until they are full grown, when they descend into the earth, and assume the pupa state; shortly after which they undergo the change to their last and perfect form.

The leaves of some species of willows are also infested with galls, which are the production, not of a species of Cynípidæ, but of one of the Tenthredínidæ (Nématus intércus *Panzer Fauna Ins. Germ.*, 90. fig. 11.; or the Tenthrèdo sálicis pentándræ *Villars*). The larvæ of this insect, instead of feeding externally upon the leaves of the willow, is enclosed in a gall, upon the substance of which it subsists, and within which it undergoes all its changes. Mr. Westwood's species Nématus gallícola (described by Mr. Stephens, *Illust. Brit. Ent.*, vol. vii. p. 36.), and the Euùra Cýnips of Newman (*Ent. Mag.*, No. 18. p. 260.), also reside in galls; whilst the larvæ of Nématus sálicis of Saint Fargeau, and of the N. càpreæ, are external feeders.

Among the Lepidóptera, the caterpillars of nearly all the species of moths belonging to the genus Cerùra (puss and kitten moths) feed upon different species of willow; and also, occasionally, the larva of the buff-tip moth (Pygæ`ra bucéphala *Steph.*). Brèpha Parthènias (the orange underwing) feeds upon poplars and willows; and Notodónta zíczac (the pebble prominent moth) upon the same: Leiocámpa dictæ`a and L. dictæöìdes (the swallow prominent moths), Ptilodóntes palpìna (the pale prominent moth), Gastrópacha quercifòlia, &c., occasionally upon willows; and the larva of Orthòsi*a* ùpsilon *Steph.* beneath the bark of old willows and poplars.

The larvæ of Satúrnia Pavònia minor feed on various species of osier. Lozotæ'nia cruciàna, a small but beautiful tortrix, lives on a dwarf mountain *S*àlix. Líparis (Leucòma *Steph.*) sálicis is, in many years, very abundant on different willows. Several species of the very showy genus of *N*octùidæ, Catocàla, also feed, in the larva state, upon several species of *S*àlix. These caterpillars exhibit a very interesting instance of deceptive similarity to the plants on which they feed; their colours being of a pale greyish brown, dotted with black, and the sides of their bodies being furnished with a membranaceous lobe, fringed with short whitish hairs, which are applied close to the surface of the twigs, so that it is very difficult for an unpractised eye to perceive them, or to distinguish them from bundles of lichens. The colours of the fore wings of the perfect insects are also equally deceptive, rendering it quite as difficult to perceive the moths when settled upon the trunks of the trees. The hind wings of these moths are, however, very beautifully coloured, being either red or pale blue, with black bands. Catocàla fráxini (the great Clifden nonpareil) feeds, in the larva state, on poplar, ash, &c.; C. núpta *L.* upon *S*àlix vitellìna; and C. elocàta *Esper* (the claim of which to be considered a native species is questionable) upon willows and elms. Our *fig.* 1293. represents the last-named species copied from Curtis's *British Entomology*, pl. 217.; and the generic

1293



details, *a* to *i*, are from C. núpta. *a*, *b*, parts of the antenna; *c*, spiral tongue; *d*, palpus; *e*, palpus denuded; *f*, the head; *g*, one of the ocelli; *h*, hind leg; *i*, claws.

Amongst Coleóptera, the principal species which feed on the willow are, Galerùca càpreæ, Pyróchroa rùbens (on the rotten wood, whilst in the larva state), Melasòma pópuli and trémula, Balanìnus salicívorus, and Tachyérges sálicis; and, amongst the Hemíptera, *A*'phis sálicis *L.*, and Cóccus càpreæ and C. sálicis *L.*

Some parts of the preceding article have been furnished to us by J. O. Westwood, Esq., by whom the whole has been revised.

The Study of the Species. The genus *S*àlix has been a stumbling block to botanists from the time of Linnæus, who observes that so great are the changes effected on the kinds by soil, situation, and climate, that it is difficult to determine whether many of the differences should constitute species, or varieties only. He recommends rejecting the old names and characters, and describing anew the several species accurately, as seen in their natural places of growth. For this purpose, he gives directions for observing the developement of the buds, the situation of the catkins, the form and other circum

stances of the leaves, the number of stamens, and whether the plants are trees, shrubs, or creepers. With due deference to the opinion thus expressed by the great father of scientific botany, we think that the study of willows, or of any other species of plant, in its native habitat is by no means a good mode for determining what are species, and what are varieties; but rather likely, on account of the great difference of habitats, to increase the number of both; since every difference may be considered specific relatively to the circumstances which produce that difference. It appears to us that it would be a better mode to collect plants of the particular genus to be studied from all the different habitats in which they are to be found, and to cultivate and study them in the same garden, where they would be all subjected to the same exterior influences. What Sir J. E. Smith says on this subject does not appear to us much more satisfactory than the advice of Linnæus. "Willows," he says, "should be particularly studied at three different seasons: the flowering time; the early part of summer, when the young shoots, with their stipules and expanding foliage, are to be observed; and, finally, when the leaves are come to their full size. No botanist, therefore, can be competent to form an opinion about them, unless he resides among the wild ones, for several seasons, or continually observes them in a garden. No hasty traveller over a country, no collector of dried specimens, or compiler of descriptions, can judge of their characters or essential differences. One principle, above all, in this department of botany, and indeed in every other, cannot be too strictly enforced. We should study a species before we decide on its characters, and not lay down rules of definition beforehand. In many plants, the differences of simple or compound, entire, serrated, or jagged, leaves; the presence or absence of stipules; though usually so essential and decisive, make no specific distinction at all. In some tribes or genera, one part affords the best specific character, in others some different part. The distinctions of willows are frequently so very nice, that the greatest observation and experience only can stamp them with due authority." (*Eng. Fl.*, iv. p. 165.) After thirty years' study of every kind of willow that could be procured in any part of Britain, in the garden of Mr. Crowe, where seedlings innumerable sprang up all over the ground, Sir J. E. Smith was not only confirmed in the immutability of his species, amounting to 64, as natives of Britain, but also, that new or hybrid species were not produced by the seeds of species growing together in the same garden. Both these conclusions are alike at variance with those of most other botanists. As the result of this eminent botanist's study of the genus, he has arrayed his 64 species of British willows under three sections, characterised by the margins and surfaces of the leaves; viz. 1. serrated and smooth; 2. entire and smooth; and, 3. surface shaggy, woolly, or silky. Since the time of Sir J. E. Smith, the principal British student of willows is Mr. Borrer; and, in Sir W. J. Hooker's *British Flora*, this able botanist has arranged the British willows, increased in Sir W. J. Hooker's work to 71 species, under 18 sections. These sections are all natural; and each is characterised by the name of a typical species. This is obviously a very great improvement in the arrangement of this genus, whether these kinds are considered as chiefly species, or chiefly varieties; and to us it appears the best adapted for the present state of our knowledge of willows, till all the known kinds shall have been studied for a number of years in one garden.

Among the Continental botanists, the late Dr. Host of Vienna, and Professor Koch of Erlangen, appear to be the principal students of willows. Dr. Host, in the preface to his *Salix*, seems disposed to consider the kinds of willow that exhibit the same appearances when under the same circumstances of soil and situation as distinct species; and he has described no fewer than 60 of these as natives of Austria. He admits the extreme difficulty of determining what are species in many cases, from the different localities in which the same species is sometimes found. For example, willows which inhabit low moist situations in valleys flower only in the spring; while those which inhabit mountains do not flower till after the melting of the snow, which sel-

dom happens before the beginning of summer. On the other hand, very many sorts, in intermediate localities, are intermediate also in their time of flowering. Hence, the same kind, when it inhabits three different regions, cannot be compared together in the same stage of growth in a living state; and, consequently, three species may, in this way, be made out of one. Dr. Host farther observes, that a great impediment to the determining of what are really species, arises from the sexes of a species often inhabiting localities very distant from each other, and sometimes even different regions; and the beautiful figures which illustrate this author's work, on the supposition that they are faithful portraits, clearly show that the male and female differ very considerably in their foliage and wood, independently altogether of their catkins.

The great master in the genus *Sàlix* may be considered Professor Koch, who has done more to advance a knowledge of this genus in his 12mo pamphlet of 69 pages, *De Salicibus Europæis Commentatio*, published in 1828, than the most voluminous of ancient or modern authors. The preface to this pamphlet is so full of instruction as to the mode of studying this family of plants, that we are confident that our readers will feel obliged to us for presenting to them the following

Abstract of Koch's Preface to his Commentary on the Genus Sàlix. The author, after noticing the difficulties to be encountered in this genus, and referring to what has been done by Linnæus, Wahlenberg, Willdenow, Smith, and others, notices the 119 species which had been sent to him by Schleicher, as found by that botanist in Switzerland, and thus, as we have before observed (p. 1456.), making the total number of species of *Sàlix* 254. Of Schleicher's species, he says that he could not find one that truly deserved the name.. They are, he adds, mere variations of species long since known; and, for the most part, different forms of one changeable species, viz., his own *S. phylicifòlia.* All Schleicher's kinds are enumerated as species in Steudel's *Nomenclator;* but Koch treats them as spurious, he recognising not more than 50 truly distinct European species.

The manner in which Koch obtained his knowledge of the genus *Sàlix* is thus given:—" For a number of years, I observed the willows growing wild in the Palatinate; also those I met with during my travels; and those which I have found, during the space of four years, in the neighbourhood of Erlangen. All the species, or singular forms, which I found growing wild were transferred to the garden; and to these were added kinds sent by my friends Mertens and Zeiher, an addition of no small importance. From the former I received genuine English willows in a living state. The whole collection was afterwards transferred to the Botanic Garden at Erlangen, where, neither care nor expense being spared, it has since been much increased. From M. Otto director of the Botanic Garden at Berlin, I also received a number of kinds. Of dried specimens I have received the whole collection of M. Seringe, from that author himself; and the greater number of the Swedish, French, and English willows, gathered in their native habitats, from Mertens; forming in the whole a greater number of species of this genus than was ever before available by one individual.

" Every genus of plants has certain peculiar features, with which constant observation and repeated examination alone can familiarise us; but there is no genus in which it is so necessary as in that of *Sàlix*, to investigate, not only its peculiar characters, but also the growth of the plants, both in a wild and a cultivated state. He who endeavours to characterise a species, either from a dried specimen or from a cultivated plant, is always liable to be deceived in its characters. Hence, amongst all the writers on willows from the time of Linnæus, Wahlenberg alone has clearly described them. He travelled through Lapland, Switzerland, the Carpathian Mountains, and Sweden; examining the kinds of this genus in their native places of growth; and, following in his footsteps, came Seringe, also a most diligent investigator. Taking these authors for my guide, although, in some instances, I have been compelled to differ from them, I here offer a synopsis of the European species of willow.

" In arranging this genus, and distributing its species, if we put near together

kinds which most resemble each other, not only may the species having a close natural affinity be recognised at a glance, but even the tyro will be greatly assisted in tracing and identifying his specimens. If, however, the usual arrangement of the species be adopted, in which the sections are characterised by having the ovaries naked or pubescent; the leaves glabrous or downy, serrated or entire [as in Smith's *English Flora*, and the *Sal. Wob.*]; then species widely separated by nature and habit must necessarily be grouped together, not to mention that these characters are in themselves liable to great changes. Fries (in *Syllog. Nov. Pl. Soc. Bot. Nat.; Ratisb. edita*, t. 2. p. 36.) first distributed the Swedish species of this genus into natural groups, according to characters taken from various parts of the plant. In like manner, I have attempted a similar distribution of the European species; but, first, I shall offer a few words with respect to the characters according to which I have divided the genus into sections and species.

"A character taken from the catkins appearing earlier than, at the same time with, or later than, the leaves is of great importance; but one taken from the situation and insertion of the catkins is still more so. The situation may be in three different modes. 1. In this a catkin is produced at the tip of a branchlet, with a few others below it, and they are all sessile; the leaves proceeding from buds at the base of the catkins. I only know of one instance of this, *S.* lanàta. 2. A bud on the tip of the last year's branchlet puts forth a catkin, and the peduncle on which it is situated increases in size, and bears leaves, in the axils of which are the buds of the following year. This peduncle is, therefore, persistent, and continues the branch. This is the case in *S.* reticulàta, *S.* herbàcea, *S.* polàris, *S.* retùsa, and *S.* U'va-úrsi. 3. A terminal bud, and generally more protruded beneath it, produce leaf-bearing shoots, and the flower buds are situated beneath these. All the other species which are known to me, except those enumerated above, belong to this division; and they may be subdivided as follows: — 1. Those in which the catkin is sessile, on a very short peduncle, or as it were incipient, and bears at its base weak scale-like leaves; being thus lateral, sessile, and bracteated at the base. 2. Those in which the peduncle grows into a branchlet, and bears floral leaves not very distant from the catkin, which afterwards become true leaves, but without buds in their axils: from this branchlet is formed the lateral catkin, which is peduncled with a leafy peduncle. All the species which protrude their catkins before their leaves belong to the first of these subdivisions; and all those which do not protrude their catkins till after their leaves, with many of those which protrude their catkins at the same time as their leaves, to the second. This character seldom changes; and only a few species (for example, *S.* limòsa) bear on one plant, or, as a variety, on two plants, catkins which have short peduncles, and are surrounded at their base with very minute scale-like leaves; and also those that are peduncled, and have true leaves on their peduncles. Even in these varying forms Nature shows her inexhaustible fertility, and her wonderful skill and power of adaptation in creation: despising the too great carefulness of learned men, who hasten to build prisons for their own systems, she delights in disturbing their magic circles, and, playfully breaking loose from the chains in which they have attempted to bind her, she far exceeds Proteus himself in versatility.

"The importance of the characters which the pedicel of the capsule offers has been pointed out by Wahlenberg. Its length relatively to the gland, which is never wanting, is a very constant character, varying only in a few species; but, to be rightly observed, it ought to be seen just at the time when the ovary attains the size of a capsule, which happens a little after flowering; or, in dried specimens, if accuracy is wanted, part of the female catkin must be softened in boiling water, and afterwards dried in blotting-paper, before examination. In dried specimens, the pedicel is so brittle, that in the analysis it is seldom preserved entire; or, from being joined to a gland not less fragile, it is frequently injured. Besides, it must be remarked, that some catkins have been found in which the inferior flowers were very remotely situated.

In these instances, the pedicel is often a little longer, and the capsules more slender.

"The colour of the young shoots varies greatly, often so much as to cause the varieties to appear distinct species. The branchlets of *S.* álba are either brown, or, as in the var. vitellìna, of a yolk-of-egg or a red brick colour; and there is a different shade of yolk-of-egg colour in *S.* rèpens, and *S. r*osmarinifòlia (*S.* læ'ta *Schultz*). Many species, when carefully examined, will be found to vary in colour, though only to a small extent. The branches of *S.* purpùrea are of a coral colour, rarely of a dark yellow, and sometimes white, covered with a reddish bloom. *S. a*mygdálina has the shoots sometimes of a brownish yellow, and sometimes of a brownish black.

"The form of the leaves in the same species, and even in the same plant, can never be depended upon. In *S. p*hylicifòlia, *S. m*yrtillòides, *S.* arbúscula, and *S.* rèpens, they vary from narrow-lanceolate and being attenuated towards the base, in the three last-named species, to roundish-ovate and being cordate-emarginate at the base. In some species, the form of the leaves is almost always the same, as in *S.* viminàlis, *S.* incàna, and *S. h*ippophaefòlia. In other species, the leaves vary; being serrated or entire, green or hoary on the under surface, and glabrous or hairy, on the same plant. The same variation is common on the exterior of the ovaries; which, in *S. p*hylicifòlia, are sometimes glabrous, and sometimes hairy; some individuals of this species having half the ovary hairy, and the other half glabrous; while in others there is only a hairy or downy line. In certain species, however, these variations are never found, or very rarely; although in *S.* viminàlis ovaries partly naked, and partly downy, occur. The brown tip of the bracteas of the flowers, in some species, turns paler, and in others red, or even purple; which is another cause of uncertainty in specific distinctions. The bracteas are sometimes obovate, and only half the length of the ovary; and sometimes, in the same species, lanceolate, and reaching as far as the style. The style and stigma likewise vary in length, and are occasionally more or less cleft; yet both these organs afford most useful characteristics. The style often appears shorter from being hidden by the long hairs of the ovary. Stigmas of a rose colour, and of a yellow colour, have been found in the same species. The stipules vary in size, but never in form; hence they afford the very best characteristics for distinguishing species. In no species can these be said to be wanting; and, though on old plants they are often not seen, such plants, when cut down, send up young shoots which produce leaves attended by stipules of an extraordinary size. The buds are always 1-valved; and the valves are often cleft at the tip, and sometimes as far as the base; though sometimes, on the same individual, they are undivided. The folding of the leaves in the bud is, most probably, constant, although different in the various species: but this I cannot affirm as certain, not having examined the leaf buds of a sufficient number of species.

"The variation of the different parts is not the only difficulty with which the botanical student, in this genus, has to contend: the great number of hybrids, the existence of which in the genus *S*àlix no one can doubt, is another obstacle. Nobody will accuse me of arrogance in assuming to know *S.* rùbra and *S.* viminàlis. On the banks of the Rednitz, near Erlangen, there are many thousand trees of these two species; and, at the same time, many intermediate forms, which I can refer to neither species. The catkins of these afford no distinguishing marks; for what seem at one time to belong to the former species, at another time appear more nearly allied to the latter." Koch concludes by stating that, in his *Commentary*, the species have been arranged in 10 groups; and that no kind has been admitted as a species that he has not himself seen and examined. He has added but few varieties, "although an immense number of no importance might have been adduced; being convinced, from daily observation and experience, that the multiplication of varieties, instead of rendering any intricate genus more clear, only involves it in a greater difficulty."

The species of Koch, besides being identified with those of the *Species*

Plantarum of Linnæus, and the *Species Plantarum* of Willdenow, have the synonymes of other authors added to them.

In our App. iii. to the genus *Sàlix* will be found the characters of Koch's 10 different groups; and under each the names and synonymes of the species which he has assigned to them.

From the perusal of Koch's observations, two points, we think, will be rendered clear to the botanical reader: — 1. That the mode of arranging the sections according to the character of the leaves, adopted by all the Linnæan school previously to the time of Wahlenberg, is altogether defective; and, 2. That the system of throwing the species into natural groups, as adopted by Wahlenberg, Fries, Koch, and Borrer, is the true one. Being ourselves of this opinion, the only question that remained for us to decide was, whether we should follow Koch or Borrer in the arrangement of the species described in this work as in a living state in British gardens.

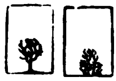
The excellence of Koch's system was strongly impressed on our mind from the moment that we saw it developed in Dr. Lindley's *Synopsis of the British Flora;* and, if we could have classed all the numerous sorts of willows in the salictum at Woburn, and in the Hackney arboretum, under Koch's ten groups, in a manner satisfactory to ourselves, we should have done so; the more especially as, from observing with care all the different sorts in the Hackney arboretum, at different periods, from March to December, 1836, we felt convinced in our own mind that by far the greater number of them were varieties, and chiefly of *S. càprea L.* Not being able to do this, we determined on endeavouring to obtain the advice and assistance of the first authority in Britain on the subject of willows; and we accordingly applied to Mr. Borrer, who at once, in the most kind and liberal manner, classed the sorts contained in the *Salictum Woburnense* in the 22 groups into which, with the exception of a few sorts, they are thrown in the following article. Mr. Borrer's knowledge of this genus is universally known. He possesses an extensive collection of living plants, which he has cultivated for some years; and, as Sir W. J. Hooker remarks, "No one has ever studied the willows, whether in a growing or a dried state, more deeply, or with a less prejudiced mind." (*Brit. Fl.*, ed. 3., vol. i. p. 416.)

The botanical details which we have given of each particular species, including a comparison of specimens obtained in a living state from the arboretum at Flitwick, from that at Goldworth, and from the salictum at Messrs. Loddiges's, were made out for us, with great care and industry, by Mr. Denson. Our figures were chiefly drawn for us by Mr. Sowerby, from specimens received from the salictum at Woburn Abbey; in the single instance of the *S. càprea*, reduced from Host's work; and nearly all the remainder, including all the 28 plates of leaves of the natural size, by the kind permission of the Duke of Bedford, have been copied from the *Salictum Woburnense*.

It will thus appear that our article, lengthy and elaborate as it is, is, in a botanical point of view, chiefly to be considered as matter for a history of willows, rather than as a complete history in itself. Such a history, indeed, can only be prepared by a botanist who has had all the species in a living state under his eye for several years; and who has applied to them one general principle of contrast or comparison. Till this is done, not only with the genus *Sàlix*, but with every other genus of which there are numerous species, a decided imperfection must ever be found in works like the present, in which the specific characters are necessarily made up of descriptions given by different individuals, at different times, and in different countries; some from living plants collected from their native habitats, others from living plants grown in gardens, and many from dried specimens. All this shows the great advantage that would result to botany and arboriculture from a national arboretum; in which not only all the species and varieties should be collected, but also both the sexes of all the kinds that have the male and female flowers on different plants. Such an arboretum, on a sufficiently large scale, and properly managed, would form a living standard of reference, both for the botanist and the cultivator.

Group i. *Purpùreæ* Koch, Borrer.

Osier Willows, with one Stamen in a Flower.



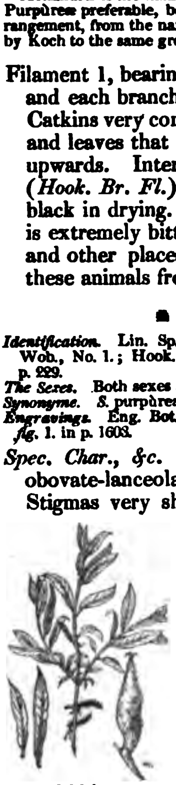
Monándræ is the name adopted for this group in *Hook. Br. Fl.*, ed. 3.; but Mr. Borrer considers Purpùreæ preferable, because it is taken, like the name of each of the other groups in this arrangement, from the name of a species included in that group. Purpùreæ, too, is the name given by Koch to the same group.

Filament 1, bearing an anther of 4 lobes, and 4 cells; or, in *S.* rùbra, forked, and each branch bearing an anther of 2 lobes and 2 cells. Germen sessile. Catkins very compact. Trees of low stature, or shrubs with twiggy branches, and leaves that are more or less lanceolate, and serrated, and often broader upwards. Interior part of the bark, in most, yellow and very bitter. (*Hook. Br. Fl.*) The leaves of nearly all of the kinds of this group turn black in drying. The inner bark of most of the kinds included in this group is extremely bitter, which renders the plants suitable for banks of rivers, and other places which are infested by rats; as the bitterness prevents these animals from eating it.

■ 1. *S.* PURPU'REA *L.* The purple Willow.

Identification. Lin. Sp. Pl., 1444.; Smith Eng. Bot., t. 1388.; Eng. Fl., 4. p. 187.; Forbes in Sal. Wob., No. 1.; Hook. Br. Fl., ed. 3., p. 417.; Mackay Fl. Hibern., pt. 1. p. 243.; Hayne Abbild., p. 229.
The Sexes. Both sexes are figured in *Eng. Bot.*, and are in cultivation in some English collections.
Synonyme. *S.* purpùrea *a Koch Comm.*, p. 25.
Engravings. Eng. Bot., t. 1318.; Sal. Wob., No. 1.; Hayne Abbild., t. 169.; our *fig.* 1294.; and *fig.* 1. in p. 1603.

Spec. Char., *&c.* Branches trailing, decumbent. Leaves partly opposite, obovate-lanceolate, serrated, very smooth, narrow at the base. Stamen 1. Stigmas very short, ovate, nearly sessile. (*Smith Eng. Fl.*) A native of Britain (between Thorpe and Norwich, &c.); flowering in March and April. In a wild state, this species forms a shrub, with a stem 3 ft. or 4 ft. high, with long, slender, smooth branches, spreading widely, and, if not supported, trailing on the ground; very smooth, of a rich and shining purple, with a somewhat glaucous hue. The catkins appear earlier than the foliage; and often on different branches. In cultivation, in dug grounds kept moist and the plants cut down yearly, this species produces shoots from 3 ft. to 5 ft. long, which are much esteemed for the finer sorts of basketwork. It is also frequently planted in Norfolk and Suffolk, and in some parts of Essex, for "plaiting into close low fences, for the exclusion of hares and rabbits; the bark and leaves being so extremely bitter, that these animals will touch neither; whilst the shoots, being long, tough, and flexible, may be formed into any shape; and a fence of this kind is reckoned little inferior to that of wire." (*Eng. Flora*, quoted in *Sal. Wob.*, p. 2.) This species is well adapted for planting in ornamental shrubberies, from the elegant slenderness of its twigs during winter; the redness of its catkins, the anthers of which are of that colour before they burst, and the fine purplish and glaucous hue of its young shoots and leaves. The latter, as will be seen by the figure of one of the natural size in p. 1603., are of an elegant, and, if we may use the expression, artistical shape. Female plants are in the Hackney and Goldworth arboretums, and at Woburn and Flitwick; and male and female at Henfield. The male plant, being the most beautiful when in flower, ought to be most propagated by nurserymen.



1294

Varieties. Koch, in his *De Salicibus Europæis Commentatio*, has described six; but he includes the *S. Hèlix* and *Lambertiàna* (to be described as species below) as two of them. He has characterised the six varieties as follows:—

S. p. 1; *S. purpùrea Smith, Willd.* — Stem dwarfer. Branches more spreading. Catkins very slender.

S. p. 2; *S. Lambertiàna* Smith, Willd. — Catkins twice as stout, and leaves larger and broader than in *S. purpùrea*; otherwise not different.

S. p. 3; *S. Hèlix Willd. En.* — Branches uprightish, but spreading. Leaves longer.

S. p. 4 *monadélphica*. — A male plant, with the stamens divided to the middle, or, rather, having 2 stamens with the filaments connate, as in *S. rùbra*, and as far as to the middle. Koch found this growing in the Palatinate of the Rhine, near Cassel.

S. p. 5 *sericea*; *S. monándra sericea Ser. Sal. Helv.*, p. 8.—This has its leaves, while they are young, covered with a dense silky down, which afterwards disappears. Seringe observed this in Switzerland; and Koch afterwards gathered it in the Palatinate.

S. p. 6 *bráctea rùbra*.—This has the scales of the catkin, that is the bracteas, of the colour of red brick, and not black. Günther sent it to Koch from Silesia; and Koch deems it a rare and singular variety.

Remark. Koch, considering *S. purpùrea* as including the above four, gives the geographical distribution of the species as follows:— It inhabits the banks of streams and moist meadows, and also sandy and comparatively dry places, in plains and lower mountains, from the Pyrenees and Alps, through England and the whole of Europe, as far as to the south of Sweden.

2. *S. Hèlix L.* The Helix, *or Rose*, Willow.

Identification. Lin. Sp. Pl., 1444.; Willd. Sp. Pl., 4. p. 672.; Hayne Abbild., p. 229. t. 170.; Smith Eng. Bot., t. 1343.; Eng. Fl., 4. p. 188.; Forbes in Sal. Wob., No. 2.; Hook. Br. Fl., ed. 3., p. 417.; Mackay Fl. Hibern., pt. 1. p. 244.

Synonymes. *S. purpùrea* var. *Koch. Comm.*, p. 25.; ? *S. oppositifòlia Host Sal. Austr.*, 1. p. 11. t. 38, 39.

The Sexes. Both sexes are figured in *Sal. Wob.*, and also in *Eng. Bot.*; but Mr. Borrer believes that the catkins of female flowers represented in the latter are those of *S. Forbyàna*: if those of *Hèlix*, they are much too thick. Mr. Borrer having only seen the male of *S. Hèlix*, and the female of *S. Lambertiàna*, is inclined to regard them as the two sexes of one species.

Engravings. Eng. Bot., t. 1343, the male plant; Sal. Wob., No. 2.; Hayne Abbild., t. 170.; and *fig.* 2. in p. 1603.

Spec. Char., &c. Branches erect. Leaves partly opposite, oblong-lanceolate, pointed, slightly serrated, very smooth; linear towards the base. Stamen 1. Style nearly as long as the linear divided stigmas. (*Sal. Wob.*, p. 3.) A native of Britain; flowering in March and April. A tree of humble growth, but erect; about 10 ft. high, smooth in every part, altogether of a lighter hue than those of *S. purpùrea*. The branches are not trailing, but upright; they are smooth and polished, of a pale yellowish or purplish ash colour, tough and pliable; less slender and elongated than the foregoing, though useful for the coarser sorts of basketwork. Catkins larger than those of *S. purpùrea*; the fertile ones, especially, full twice as thick. (*Eng. Flora*, p. 188.) The branches, which are yellow, and the mode of growth, which is erect, render this species easily distinguishable from the preceding.

Description. The name rose-willow relates to rose-like expansions at the ends of the branches, which are caused by the deposition of the egg of a cynips in the summits of the twigs, in consequence of which they shoot out into numerous leaves, totally different in shape from the other leaves of the tree, and arranged not much unlike those composing the flower of a rose, adhering to the stem even after the others fall off. (*Smith*, and *Kirby and Spence.*) Smith had never seen this monstrosity but on *S. Hèlix*, except once on *S. aurìta*: but it is very common on *S. Hoffmanniàna* in Sussex (*Borrer*), and on *S. álba* in Cambridgeshire, and is obvious in winter when the plants are leafless. In these two kinds, the rose-like bodies are constituted of leaves imbricately disposed, the upper the smaller: some of the bodies are 3 in. over. "The leaves and twigs are less bitter than those of *S. purpùrea*; and the greater size of the stem, as well as branches, renders this species fit for several purposes which that is not. It also makes a better figure in plantations, and the roots give more solidity to the banks of rivers or ditches." (*Smith.*) Gerard describes the rose-willow, of which he has given a figure, as "not only making a gallant show, but also yielding a most cooling aire in the heat of summer, being set up in houses for the decking of the same." Dr. Johnston, in his *Flora of Berwick upon Tweed*, states that *S. Hèlix* withstands storms better than any other species. A crystallisable principle, called salicine, has been obtained from this species; which, according to Majendie, arrests the progress of a fever with the same power as sulphate of quinine. (*Jour. R. Inst.*, October, 1830, p. 177.; *Lindl. Nat. Syst.*, p. 187. See also our p. 1459.) In ornamental plantations, *S. Hèlix* is an interesting shrub, from its

slender shoots and glaucous leaves, which latter have a peculiar twist; whence, perhaps, the specific name of *Hèlix*, snail-like. There are plants at Hackney, Goldworth, Woburn, Henfield, and Flitwick.

■ 3. *S.* LAMBERT*IA'NA* Smith. Lambert's, *or the Boyton*, Willow.

Identification. Sm. Fl. Br., p. 1041.; Eng. Bot., t. 1359.; Willd. Sp. Pl., 4. p. 673.; Smith Eng. Fl., 4. p. 190.; Forbes in Sal. Wob., No. 3.; Hook. Br. Fl., ed. 3. p. 417.; Mackay Fl. Hibern., pt. 1. p. 244.
Synonyme. *S.* purpùrea β *Koch Comm.*, p. 25.
The Sexes. Both are figured in *Eng. Bot.* and *Sal. Wob.* Mr. Borrer has only seen the female of this, and the male of *S. Hèlix*, and thinks they are the two sexes of one species.
Engravings. Eng. Bot., t. 1359.; Sal. Wob., No. 3.; and *fig.* 3. in p. 1603.

Spec. Char., &c. Branches erect. Leaves partly opposite, obovate-lanceolate, pointed, serrated, smooth; rounded at the base. Stipules none. Stamen 1. Stigmas ovate, obtuse, notched, very short, nearly sessile. (*Eng. Fl.*, iv. p. 189.) A native of England, flowering in March and April. This species is of the size and habit of the last, but very distinct from it at first sight, particularly in the tender summits of the young growing branches, which, with their purplish glaucous hue, and some degree of downiness, resemble those of a honeysuckle. Catkins not more than half the size of those of *S. Hèlix*, with rounded, blackish, hairy scales. (*Sm. Eng. Fl.*) First discovered on the banks of the Willey, at Boyton, Wilts, by A. B. Lambert, Esq., whom the specific name is meant to compliment. It grows in North America, on the banks of rivers and willow grounds. It was introduced from Europe, and is cultivated for basket-making. (*Pursh.*) *S.* Lambert*iàna* is suitable for introducing into ornamental plantations, from the graceful character of its slender shoots, and its glaucous foliage. There are plants in the Hackney and Goldworth arboretums, and also at Woburn, Flitwick, and Henfield.

■ 4. *S.* WOOLLGAR*IA'NA* Borr. Woollgar's Willow.

Identification. Borr. in Eng. Bot. Supp., t. 2651.; Hook. Brit. Fl., ed. 3., p. 417.
Synonymes. *S.* monándra *Sal. Wob.*, No. 4.; *S.* monándra var. *Hoffm. Hist. Sal.*, 1. p. 21. t. 1. f. 1.
The Sexes. The female is figured in *Eng. Bot. Suppl.*, and both sexes in *Sal. Wob.*; yet Mr. Borrer, in his elucidation of this kind, published in *Eng. Bot. Suppl.*, subsequently to the publication of *Sal. Wob.*, remarks that he is unacquainted with the male flowers.
Engravings. Sal. Wob., No. 4.; Eng. Bot. Supp., t. 2651.; and *fig.* 4. in p. 1603.

Spec. Char., &c. Erect. Leaves cuneate-lanceolate, serrated, glabrous. Stamen 1. Ovary ovate, very pubescent, sessile, downy. Stigmas nearly sessile, ovate, scarcely emarginate. (*Hook. Brit. Fl.*, p. 417.) A native of England, about Lewes, Sussex, in osier holts, but scarcely wild; at Kingston upon Thames, apparently wild; flowering in May. In the salictum at Woburn, this species had not attained the height of 6 ft. in five years. It is considered to be very distinct from either *S. Hèlix* or *S.* Lambert*iàna*. Mr. Borrer applied the specific name in compliment to the late Mr. Woollgar, "a gentleman who supplied Sir J. E. Smith with several of his willows, and who formed his opinions upon the species from long and accurate observation." (*Hook. Br. Fl.*, ed. 3.) *S.* Woollgar*iàna* had long been known to Mr. Borrer and Mr. Woollgar as a variety of *S.* monándra *Hoffm.*; but Mr. Woollgar was so far of opinion that it was a distinct species, that he used to call it *S.* cuneifòlia, from the shape of its leaves, especially the upper ones. (*Ibid.*) There are plants at Henfield, and in the Goldworth Arboretum; and some, with the name of *S.* monándra, in that of Messrs. Loddiges.

■ 5. *S.* FORBY*A'NA* Smith. Forby's Willow, *or the fine Basket Osier.*

Identification. Smith Fl. Br., p. 1041.; Eng. Bot., t. 1344.; Rees's Cyc., No. 49.; Willd. Sp. Pl., 4. p. 674.; Smith Eng. Fl., 4. p. 191.; Forbes in Sal. Wob., No. 5.; Hook. Br. Fl., ed. 3., p. 418.; Mackay Fl. Hib., pt. 1. p. 244.; Hayne Abbild., p. 231. t. 172.
Synonymes. *S.* fissa *Lin. Soc. Trans.*, not of Hoff. (*Smith*); *S.* rùbra β *Koch Comm.*, p. 27.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* The male is not known. "The original plant, sent from Mr. Forby to Mr. Crowe, was found now and then to bear a solitary stamen at one of the lower bracteas of the catkins of female flowers, which showed this species to be truly monandrous, and distinct from Hoffmann's *S.* fissa, to which it had previously been referred." (*Smith.*)
Engravings. Eng. Bot., t. 1344.; Sal. Wob., No. 5.; Hayne Abbild., t. 172.; and *fig.* 5. in p. 1603.

Spec. Char., &c. Branches erect. Leaves alternate, with small stipules, lanceo-

late-oblong, with shallow serratures, smooth, rounded at the base, glaucous beneath. Stamen 1. Style nearly as long as the linear divided stigmas. (*Smith Eng. Fl.*) A native of England, flowering in April. The stem is erect, bushy, with upright, slender, smooth twigs, very flexible and tough, of a greyish yellow, not purple, hue. Fertile catkins extremely like those of *S. Hèlix*, but the leaves widely different. A valuable species for the finer sorts of wickerwork, and for basket-making, bands for tying faggots, packets, &c. When cut down, plants make shoots from 5 ft. to 7. ft. long. There are plants at Hackney, Goldworth, Woburn, and Flitwick.

■ ⚲ 6. *S.* RU`BRA *Huds.* The red, *or green-leaved*, Willow, *or Osier.*

Identification. Huds. Fl. Angl., p. 428.; Smith's Eng. Bot., t. 1145.; Willd. Sp. Pl., 4. p. 674.; Smith's Eng. Fl., 4. p. 191.; Forbes in Sal. Wob., No. 6.; Hook. Br. Fl., ed. 3., p. 418.; Mackay's Fl. Hib., pt. 1. p. 244.; ? Hayne Abbild., p. 230.
Synonymes. The name rùbra seems to be originally given to *S.* vitellìna, a reddish [? twigged] variety of which was confounded with *S.* rùbra *Huds.* (*Smith.*); *S.* rùbra, in part, *Koch Comm.*, p. 26.; *S.* fissa *Hoffm. Sal.*, 1. p. 61. t. 13, 14. (*Smith*); *S.* cóncolor *Host Sal. Aust.*, 1. p. 10. t. 34, 35., from Host's citation of Ray; *S.* virèscens *Vill. Dauph.*, 3. 785. t. 51. 30. (*Smith*); *S.* lineàris *Walker's Essays*, p. 467., on the authority of Borrer.
The Sexes. Both are described in *Eng. Fl.*; and the female is figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1145.; Sal. Wob., No. 6.; ? Host Sal. Aust., t. 1. t. 34, 35.; Villars Dauph., 3. t. 51. f. 30. (*Smith.*); ? Hayne Abbild., 171.; and our *fig.* 6. in p. 1604.

Spec. Char., &c. Stamens combined below in a manner which affords a character in which it differs from all other British kinds of willow, except *S.* Croweàna, and from nearly all the foreign kinds. Mr. Borrer, however, has observed the same thing occasionally in *S.* fùsca, and in several of the Cinèreæ. "Leaves linear-lanceolate, elongate, acute, smooth, with shallow serratures; green on both sides. Stigmas ovate, undivided." (*Smith E. F.*) A native of Britain (in England, in low meadows and osier holts, as at Maidenhead, &c., but rare; in Scotland, frequent in hedges and osier grounds); flowering in April and May. In its wild state, it forms a small tree. The branches are long, upright, smooth, greyish or purplish, more frequently tawny, and very tough and pliant. The leaves are very long and narrow, and agree in shape with those of the common osier, *S.* viminàlis; but have not, as that has, dense white pubescence beneath. (*Smith.*) Koch considers the *S.* Forbyàna of Smith as a variety of *S.* rùbra; and states that both are common about Erlangen, where there is also another variety, which he regards as a hybrid between *S.* rùbra and *S.* viminàlis. The leaves of this kind, even when adult, have their under surface covered with a dense silky down, like those of *S.* viminàlis; the young shoots bear stipules the length of the petiole, like those of *S.* stipulàris; and the catkins resemble those of *S.* rùbra. There are plants of *S.* rùbra at Hackney, Goldworth, Woburn, Henfield, and Flitwick. When the plants of this species are cut down, they send out shoots from 5 ft. to 8 ft. in length; and it is consequently one of the most valuable osiers in cultivation, for bands, crates, basketwork or wickerwork, and even small hoops.

Statistics. In the garden of the Horticultural Society of London, 10 years planted, it is 12 ft. high; at Shepperton, on the Thames, it is 30 ft. high.

App. i. *Purpùreæ of which Plants have been introduced, but not described.*

S. ellíptica Lodd. Cat., ed. 1836. Leaves resembling *S. Hèlix*, but narrower.

App. ii. *Purpùreæ described by Authors, but not yet introduced, or of doubtful Identity with Species already in the Country.*

S. cóncolor, mas et fem., Host Sal., 1. p. 10. t. 34, 35., Fl. Aust., 2. p. 639.; syn. *S.* mínima frágilis fòliis longissimis, &c., *Raii Syn.*, 449. In the *Eng. Fl.*, Ray's species is identified with *S.* rùbra; but Host's plant may possibly be something different.

S. Hèlix, mas et fem., Host Sal., 1. p. 10. t. 36, 37., Fl. Aust., 2. p. 639. This species, Host observes, when growing among trees, becomes a tall tree; but under other circumstances is dwarfer.

S. oppositifòlia, mas et fem., Host. Sal., 1. p. 11. t. 38, 39., Fl. Aust., 2. p. 640. Host has applied to this a syn. of Ray, which identifies it with *S. Hèlix L.*

S. purpùrea, mas et fem., Host Sal., 1. p. 12. t. 40, 41., Fl. Aust., 2. p. 640. The catkins resemble those of the *S.* purpùrea of British botanists; and, hence, the two plants may be identical.

S. mutábilis, mas et fem., Host Sal., 1. p. 12. t. 42, 43., Fl. Aust., 2. p. 640. Very different from the *S.* mutábilis of *Sal. Wob.*

S. *carniólica*, mas et fem., Host Sal., 1. p. 13. t. 44, 45., Fl. Aust., 2. p. 641. Abundant in Carniola, where it is used by the inhabitants, for many purposes; such as hedges for small gardens, meadows, and stony fields. It is also planted on the banks of streams, for fixing by its roots their sandy or gravelly banks. The shoots of the year are very long, unbranched, and tough: when peeled, they are yellow, and are much used in basket-making. At the time of flowering, many of the ovaries become wounded by insects, and afterwards much enlarged.

S. *mirábilis*, mas, Host Sal., 1. p. 13. t. 46., Fl. Aust., 2. p. 641. Of the catkins upon a plant, some consist of male flowers only, some of female flowers only, and many of male flowers intermixed with female ones. In some catkins, male flowers occupy the lowest part of the catkin, and female flowers the remaining part; and catkins are found which have the flowers in the lower and upper part male, and in the intermediate part female. Each flower includes two distinct stamens, or two connate in the lower part, or connate to near the tip, or often a single stamen. It is not rare to find filaments devoid of anthers. These anomalies in the flowers of this species are probably alluded to in the epithet mirábilis.

Group ii. *Acutifòliæ* Borrer. (*Syn.* Pruinòsæ *Koch.*)

Willows with dark Bark, covered with a fine Bloom.



Stamens 2, distinct. Tall shrubs, or becoming trees. Bark of the branches and shoots of a dark colour; that of the branches suffused with a whitish matter, which is the character implied by Koch's term Pruinòsæ. This matter is easily rubbed off. The bark is internally yellow, as in Group i. Foliage of a lively green. Leaves lanceolate, acuminately pointed, serrate, glossy; in many instances, downy when young, subsequently glabrous. Ovary and capsule sessile, or nearly so. (*Koch*, *Forbes*, and observation.)

■ ↟ 7. *S.* ACUTIFO'LIA *Willd.* The pointed-leaved Willow.

Identification. Willd. Sp. Pl., 4. p. 668.; Koch Comm., p. 22.

Synonyme. *S.* violàcea *Andr. Bot. Rep.*, t. 581., *Smith* in *Rees's Cyclo.*, No. 33., *Forbes* in *Sal. Wob.*, No. 25., and of many English collections; but not *S.* violàcea *Willd.*, nor the *S.* càspica *Hort.* (*Willd.*)

The Sexes. The male is figured in *Sal. Wob.*, and is, perhaps, the only one cultivated in British collections. Koch has implied that the female was unknown to him in any state.

Engravings. Andr. Bot. Rep., 581.; Sal. Wob., No. 25.; and our *fig.* 25. in p. 1607.

Spec. Char., *&c.* Leaves linear-lanceolate, acuminated, smooth, with blunt unequal serratures, glaucous beneath. Catkins of the male about 1 in. long. (*Sal. Wob.*, p. 49.) It is indigenous to Podolia, according to Besser. (*Koch Comm.*) It was introduced into Britain previously to 1810, as Mr. Borrer saw it growing in St. Andrew's Square, Edinburgh, in that year. In England, it flowers in March or April, before the expansion of the leaves. It is a small tree, with dark violet-coloured branches, slender, upright, and covered all over with a whitish powder, like the bloom of a plum. Only the male plant is in the Woburn salictum. This is a very beautiful species, well deserving of culture in an ornamental point of view; and Mr. Forbes thinks its twigs would be useful for wickerwork. The catkins of the male are ornamental, but, so far as we have seen, are not numerously produced. The leaves are rather elegant. Its shoots and roots have the inner part of the bark, or covering, of a yellow colour, and very bitter flavour; and, hence, this kind may be eligible for planting upon banks in which rats burrow. In the Horticultural Society's Garden, in 1835, there was a plant of this species 15 ft. high. There are plants in the Hackney and Goldworth arboretums; and at Woburn Abbey, Flitwick House, and Henfield.

↟ 8. *S.* DAPHNÖI'DES *Villars.* The Daphne-like Willow.

Identification. Vill. Dauph., 3. p. 765., t. 50. f. 7., "t. 5. f. 2." as quoted by Host; Koch Comm., p. 23.

Synonymes. *S.* præ'cox *Hoppe* in *Sturm D. Fl.*, 1. 25., *Willd. Sp. Pl.*, 4. p. 670., exclusively of the syn. of Host; *Smith* in *Rees's Cyclo.*, No. 40., *Forbes* in *Sal. Wob.*, No. 26.; *S.* bigémmis *Hoffm. Germ.*, 2. p. 260., *Sal.*, t. 32.; *S.* cinèrea *Host Sal. Austr.*, 1. p. 8. t. 26, 27. Mr. Borrer, in a letter, has remarked that Smith has erroneously cited, in his *Flora Brit.*, *S.* daphnöides *Villars* as a synonyme of *S.* cinèrea *Smith*; and that this has led Koch to cite *S.* cinèrea *Smith* as a synonyme of *S.* daphnöides *Villars*.

The Sexes. Both sexes are figured in *Sal. Wob.*, and both are described and figured in *Host Sal. Austr.*

Engravings. Vill. Dauph., 3. t. 50. f. 7. ? or 3. t. 5. f. 2.; Hoffm. Sal., t. 32.; Sal. Wob., No. 26.; Host Sal. Aust., 1. t. 26, 27.; our *fig.* 1295.; and *fig.* 26. in p. 1608.

1295



Spec. Char., &c. Leaves broadly lanceolate, and pointed, with glandular serratures, smooth, glaucous beneath. Catkins appearing before the leaves. Ovary sessile, ovate, smooth. Style elongated. (*Sal. Wob.*, p. 51.) A native of Switzerland and the south of France; flowering at Woburn in February. Introduced in 1820. It is a rapid-growing tree, with dark greyish branches, slightly covered with a powder, or bloom, similar to that of *S.* acutifòlia; the branches ascending obliquely. The tree at Woburn, though only four years planted, was, in 1830, nearly 25 ft. high. The catkins appear often in February, from large crimson buds, which distinguish this species from every other, and make it very ornamental. There are plants in the arboretum of Messrs. Loddiges, and at Flitwick, and Henfield.

Variation. The buds containing catkins are very large in the autumn; and, in this state, it is the *S.* præ`cox gemmàta *Ser. Sal. exsicc.*, No. 83. (*Koch Comm.*, p. 23.)

♀ 9. *S.* POMERA'NICA *Willd.* The Pomeranian Willow.

Identification. Willd. Enum. Suppl., 66.; Forbes in Sal. Wob., No. 153.
Synonymes. *S.* daphnöides *Villars* var., with narrower leaves, and more slender catkins. (*Koch Comm.*, p. 23.) Mr. Borrer, in his manuscript list of grouped species, has indicated it as being probably a variety of *S.* daphnöides.
The Sexes. The female is described in *Sal. Wob.*

Spec. Char., &c. Leaves lanceolate, tapering at both extremities, serrated; smooth and shining above, glaucous underneath. Stipules ovate, serrated; their margins generally revolute. Catkins about 1 in. long. Ovary ovate, smooth. Style longer than the parted stigmas. (*Sal. Wob.*, p. 281.) A native of Pomerania. Introduced in 1822, and flowering, in the Woburn salictum, in February and March. This is a rapid-growing kind, much resembling, in the colour of its branches and its mode of growth, *S.* præ`cox. The branches are long, smooth, round, shining, and copiously covered with small yellow dots: the preceding year's shoots are covered with a violet-coloured powder, similar to that on the shoots of *S.* præ`cox, and *S.* acutifòlia. The leaves are about 4 in. long, and nearly 1 in. broad, tapering towards both extremities, serrated; the serratures somewhat glandular, smooth, and shining on their upper surface, and glaucous underneath. Footstalks nearly 1 in. long, purplish and villous on their upper side. Catkins appearing before the leaves, and about 1 in. long. There are plants in the Goldworth Arboretum, at Woburn Abbey, Henfield, and Flitwick.

Group iii. *Triándræ* Borrer. (*Syn.* *A*mygdálinæ *Koch.*)

Osier Willows, with three Stamens in a Flower.



Stamens 3. Leaves lanceolate, approaching to ovate, serrated, glabrous, having large, rounded, toothed, more or less deciduous, stipules. Flowers loosely disposed in the catkin. Pistil stalked. Ovary mostly glabrous. Most of the kinds constitute excellent osiers, and become trees if left to themselves. (*Hook. Br. Fl.*, 2d ed., with adaptation.) The kinds may be denominated, generally, the osiers with 3 stamens in a flower. Most, or all, when in the state of larger shrubs and trees, have their older bark exfoliated in broad patches, in the manner of that of the western and eastern plane trees (*Plátanus* occidentàlis *L.*, and *P.* orientàlis *L.*). Most or all are ornamental as shrubs, for their lanceolate, glossy, serrated leaves, and their flowers.

♀ ■ 10. *S.* UNDULA'TA *Koch, Hooker.* The wavy-*leaved* Willow.

Identification. Koch Comm., p. 20.; Hook. Fl. Br., ed. 3., p. 419.; ? Hayne Abbild., p. 220.
Synonymes. Koch has cited as identical with, or included in, *S.* undulàta, the following kinds; —

S. undulàta *Ehrh. Beytr.*, 6. p. 101., according to the specific character, but without inspection of Ehrhartian specimens, *Willd. Sp. Pl.*, 4. p. 655.; ? *S.* No. 38., *Trev. Obs. Bot.*, p. 18.; and, as a variety, *S.* lanceolàta *Smith Eng. Bot.*, t. 1436., according to an authentic English specimen. Hooker has deemed identical with *S.* undulàta of his *Br. Fl.*, ed. 3., p. 419., the kinds now to be noticed: — *S.* lanceolàta *Smith Eng. Bot.*, t. 1436., *Eng. Fl.*, and *Forbes* in *Sal. Wob.*, No. 14. "Dr. Meyler of Göttingen has sent me specimens of the *S.* undulàta of Ehrh., compared with the Ehrhartian herbarium; and Mr. Borrer is satisfied that they are identical with Smith's *S.* lanceolàta; at least, with the Sussex specimens communicated by Mr. Woollgar to him, and which are probably the same with the females figured in *Eng. Bot.* Indeed, that station (viz. near Lewes, in Sussex,) is the only one mentioned by Sir J. E. Smith as English. Mr. Borrer has received German specimens of *S.* undulàta with silky germens; and these are probably the *S.* undulàta of *Salict. Wob.*, which differs only in that respect, and in its more wavy leaves, from our present plant. (*Brit. Fl.*, ed. 3., p. 419.)

The Sexes. The female is figured in *Sal. Wob.*, Nos. 13. and 14., and in *Eng. Bot.*, t. 1436.; and is described in *Eng. Fl.* Koch noted that he had seen the female wild and cultivated, but that he had no knowledge of the male.

Engravings. Sal. Wob., Nos. 13. and 14.; Eng. Bot., t. 1436.; ? Hayne Abbild., t. 160.; our *fig.* 1296.; and *figs.* 13 and 14. in p. 1605.

Spec. Char., &c. Leaves lanceolate, acuminate through much of their length, serrulate at the tip, and minutely crenulate at the base; at first pubescent, but becoming glabrous; wavy at the edge, or not. Stipules half-heart-shaped. Catkin peduncled upon a leafy twiglet. Bractea bearded at the tip. Stamens 3. Capsule ovate-conical, more or less pubescent, or glabrous, stalked; the stalk twice the length of the gland. Style elongated. Stigmas bifid. (*Koch.*) It inhabits the banks of streams, in the plains and lower valleys in the north of Germany, and in England. (*Id.*)



1296

Varieties.

¥ ▲ S. *u.* 2; *S.* undulàta *Forbes* in *Sal. Wob.*, No. 13.—Mr. Forbes has given the following specific character, or diagnosis, of this kind, he treating it as a species; and, as this character may serve to portray its main features, we retain it in application to it, viewed as a variety. Leaves linear-lanceolate, acuminate, somewhat attenuated towards the base; wavy, and sharply serrated at their margins. Ovary sessile, ovate, scarcely downy. Style about half the length of the linear parted stigmas. (*Sal. Wob.*, p. 25.) Cultivated in the Dublin Botanic Garden, and flowering in April and May. It is an upright-growing plant, soon forming a bushy tree, about 10 ft. or 12 ft. high, with brown, smooth, round branches, slightly downy when young, and somewhat angular at the points. Catkins about 1 in. in length, bursting forth with the leaves. "This is a species very distinct from the above, which is considered to be the *S.* undulàta of Ehrhart; from which it is readily distinguished by long, taper-pointed, wavy leaves. I conceive it to be a foreign kind. I have not observed it in any collection but that contained in the Dublin Botanic Garden, from which I derived it." (*Forbes* in *Sal. Wob.*) In relation to this kind, Mr. Borrer has remarked in his list, that, "if *S.* undulàta *Forbes*, and *S.* lanceolàta *Smith* and *Forbes*, the *S.* undulàta *Hooker*, are to be regarded as two species, the former agrees best with Ehrhart's character of his *S.* undulàta." There are plants in the Hackney and Goldworth arboretums, and at Woburn Abbey, Henfield, and Flitwick House.

¥ ▲ S. *u.* 3; *S.* lanceolàta *Smith Eng. Bot.*, t. 1436., *Eng. Fl.*, iv. p. 168., *Forbes* in *Sal. Wob.*, No. 14.—The following is Smith's diagnosis of this kind:—Leaves lanceolate, serrated, glabrous, tapering towards each end. Footstalks decurrent. Ovary stalked, ovate, glabrous. Styles as long as the stigmas. (*Smith Eng. Fl.*) Smith has farther noted of its distinctive characters as follows:—"Akin to *S.* triándra *Lin.* and *S.* Hoffmanniàna Smith. An essential means of distinction exists in the leaves, which are longer and narrower than those of *S.* triándra, or any of its reputed varieties; more pointed and tapering; not linear, but truly lanceolate. Footstalks bearing

at the summit a pair of glands, or minute leaflets; not abrupt at the base, but decurrent, each meeting with a projection of the branch, tapering downward, and forming a kind of buttress; which character is clear and invariable." (*Ibid.*) There is a plant of *S.* lanceolàta in the Botanic Garden, Twickenham; and there are also plants in the Hackney and Goldworth arboretums, and at Henfield and Flitwick House. Mr. Forbes observes that this sort deserves cultivation, as the rods are much used for hampers, crates, &c. although not so well adapted for tying bundles, and for the finer sorts of wicker work, as the *S.* triándra.

‡ ■ S. *u.* 4, having the catkins androgynous. *S.* undulàta occurs in this case. (*Koch Comm.*, p. 20.)

■ 11. *S.* HIPPOPHAEFO'LIA *Thuillier.* The Sea-Buckthorn-leaved Willow, *or Osier.*

Identification. Thuil. Paris., p. 514.; Sering. Sal. exsicc., No. 44.; Koch Comm., p. 20.; Link Enum.

Synonyme. *S.* undulàta *Treviranus Obs. Bot.*, p. 17., *Koch* in *Regensb. Bot. Zeitung*, 1820, p. 311. *S. hippophaefòlia Thuil.* is so similar to *S.* undulàta, as to be, perhaps, but a variety of that species. (*Borrer* in a letter.)

The Sexes. Both are noticed in the specific character.

Spec. Char., &c. Leaf lanceolate, obsoletely crenulate in a repand manner; toothed with glanded teeth, so small as to seem to consist of glands only; acuminate through much of its length, downy, eventually glabrous. Stipules half-heart-shaped. Catkin borne on a leafy peduncle, which is a twiglet. Bractea hairy. Stamens 2. Capsule ovately conical, tomentose, downy, or glabrous; seated on a stalk that is as long as the gland. Style long. Stigma bifid. (*Koch.*) Wild in the plains and lower valleys of the Palatinate, Wetteravia, Silesia, and the north of Germany. Treviranus thinks that this is the true *S.* undulàta of Ehrhart; "but I," says Koch, "have not been able to find any of its leaves undulated, among many specimens observed growing wild; but, perhaps, Ehrhart included this in his *S.* undulàta, to which it is too near akin to be a species distinct from that." (*Id.*)

■ ‡ 12. *S.* TRIA'NDRA *L.* The 3-stamened-*flowered* Willow, *or Osier.*

Identification. Lin. Sp. Pl., 1442.; Willd. Sp. Pl., 4. p. 654., Smith Eng. Bot., t. 1435.; Eng. Fl. 4. p. 166.; Forbes in Sal. Wob., No. 15.; Hook. Fl. Br., ed. 3., p. 419.; Wade's Salices, p. 6.; Mackay Fl. Hibern., pt. 1. p. 245.; ? Hayne Abbild., p. 219.

Synonyme. *S. amygdálina*, part of, *Koch Comm.*, p. 19.

The Sexes. Both sexes are figured in *Eng. Bot.* and *Sal. Wob.*

Engravings. Gmel. Sib., 1. 155. t. 34. f. 3.; ? Hayne Abbild., t. 159.; Eng. Bot., t. 1435.; Sal. Wob., No. 15.; our *fig.* 1297.; and *fig.* 15. in p. 1605.

Spec. Char., &c. Leaves linear-oblong, serrated, glabrous, rather unequally sloping at the base. Stamens 3. Ovary stalked, ovate, compressed, glabrous. Stigmas nearly sessile. (*Smith E. Fl.*) Bractea (or scale) clothed externally with fine, long, spreading, more or less plentiful hairs. (*Ibid.*) Bractea glabrous. (*Hook. Br. Fl.*, 3d ed.) Mr. Woollgar used to distinguish this species by the dark-barked smooth shoots of the female plant. The male one he never met with at Lewes. (*Ibid.*) A native of Britain, in wet woods and osier grounds, where it forms an upright tree, rising naturally, when not injured, to the height of 30 ft. Leaves always perfectly glabrous. This species is extensively cultivated for the long tough rods which it produces when cut down, which are in frequent use for wicker-work, hoops, &c. "*S.* triándra is one of the most valuable osiers. It is cultivated for white basketwork, producing rods 8 ft. or 9 ft. long, tough and pliant, even when stripped of their bark, and very durable. They are cut down every year." (*Smith* in *Eng. Fl.*) There are plants in the Goldworth arboretum, at Flitwick House, at Henfield, and at Woburn Abbey.

Varieties. Several varieties, if not distinct species, are comprehended under the name of *S.* triándra. "Of these, I venture to separate one as a species,

1297



by the name of *S.* Hoffmanni*àna.*" (*Ibid.*) Mr. Forbes, after describing the kind that he has adopted as *S.* triándra, adds, "I have another state of this, with much larger and broader leaves."

■ ♈ S. ? *t.* 2. *The French Willow*, so called, and cultivated, in Sussex, and the east parts of England. (*Ibid.*) — *Description.* "12 ft. to 15 ft. high. Disks of leaves of but half the size of those of the *S.* triándra described by Smith, of a fine bright green. Petioles more slender. Stipules larger. Catkins large and yellow. Stamens 3 or more, thrice as long as the bractea. I have not seen the female flowers, nor am I informed of the peculiar properties of this kind. Mr. Crowe used to name it *S.* contórta, and esteem it a doubtful species, and not supposed to be wild in Britain." (*Ibid.*) Synon. *S.* triándra *Curt. Fl. Lond.* (*Borrer* in a letter.) About Lewes, Sussex, it is confined to the osier-grounds. (*Borrer* in *Hook. Br. Fl.*, 2d ed.) This is apparently the *S.* Hoppe*àna* Willd., differing only, according to my specimens from Salzburg, in the notched or retuse bracteas. (*Hooker, ibid.*) Smith has quoted the *S.* triándra

Curt. Fl. Lond. as identical with *S.* Hoffmanni*àna* Smith; but has remarked that it may possibly prove distinct, and that it doubtless is so from the *S.* triándra, which he has described. There are plants at Henfield.

- ✿ ⚲ S. ♀ *t.* 3 *Hoppeàna*; *S.* andrógyna *Hoppe*, quoted in *Willd. Sp. Pl.*, iv. p. 654., under *S.* Hoppe*àna* Willd.; *S.* Hoppe*àna* Willd. Sp. Pl., iv. p. 654., Smith in Rees's Cyclo., No. 2., Hayne Abbild., p. 218. t. 158.; *S.* triándra andrógyna *Seringe*, quoted in *Hayne Abbild.*; *S.* amygdálina, part of, *Koch Comm.*, p. 18.—Smith, in his *Eng. Fl.*, iv. p. 167., has incidentally described this, after *S.* triándra, as follows:—"*S.* Hoppe*àna* Willd. is characterised by having some catkins composed partly of male and partly of female flowers. Its leaves, though very glaucous beneath, agree nearly with those of *S.* triándra, of which species Mr. Sieber, who sent me specimens from Salzburg, appears to think it a variety." (*Smith.*) It is shown, under var. 2, that Hooker deems *S.* Hoppe*àna* apparently identical with that variety. Introduced in 1820.
- ✿ ⚲ *S.* ♀ *t.* 4; *S.* triándra undùlata *Mertens, ined.* — This is an approach to *S.* amygdálina; the twigs are of a yellowish grey as in that kind, and their young points grooved, but in a less remarkable degree. Mr. Forster regards this, and not the French willow of the Lewes basket-makers, as the *S.* contórta of Mr. Crowe. I have plants of both sexes from the Lewes osier grounds. (*W. B.*)

✿ 13. *S.* HOFFMANNI*A'NA* Smith. Hoffmann's Willow, *or Osier.*

Identification. Smith Eng. Fl., 4. p. 168.; Forbes in Sal. Wob., No. 16.; Borrer in Eng. Bot. Suppl., t. 2620.; Hook. Br. Fl., ed. 3., p. 420.
Synonyme. *S.* triándra *Hoffm. Sal.*, 1. p. 45. t. 9, 10., 23. f. 2. (*Smith*) ? exclusively of vars. (*Borrer* in *Hook. Br. Fl.*) *S.* Hoffmanni*àna* Sm. seems to be the *S.* triándra of German botanists in general. (*Smith* in *Eng. Fl.*, 2. p. 167.)
The Sexes. The male is figured in Eng. Bot. Suppl., and in Sal Wob.; a notice relative to what has been regarded as the female is given in Engl. Flora.
Engravings. Hoff. Sal., 1. t. 9, 10., and 23. f. 2.; Sal. Wob., No. 16.; Eng. Bot. Suppl., t. 2620.; and *fig.* 16. in p. 1606.

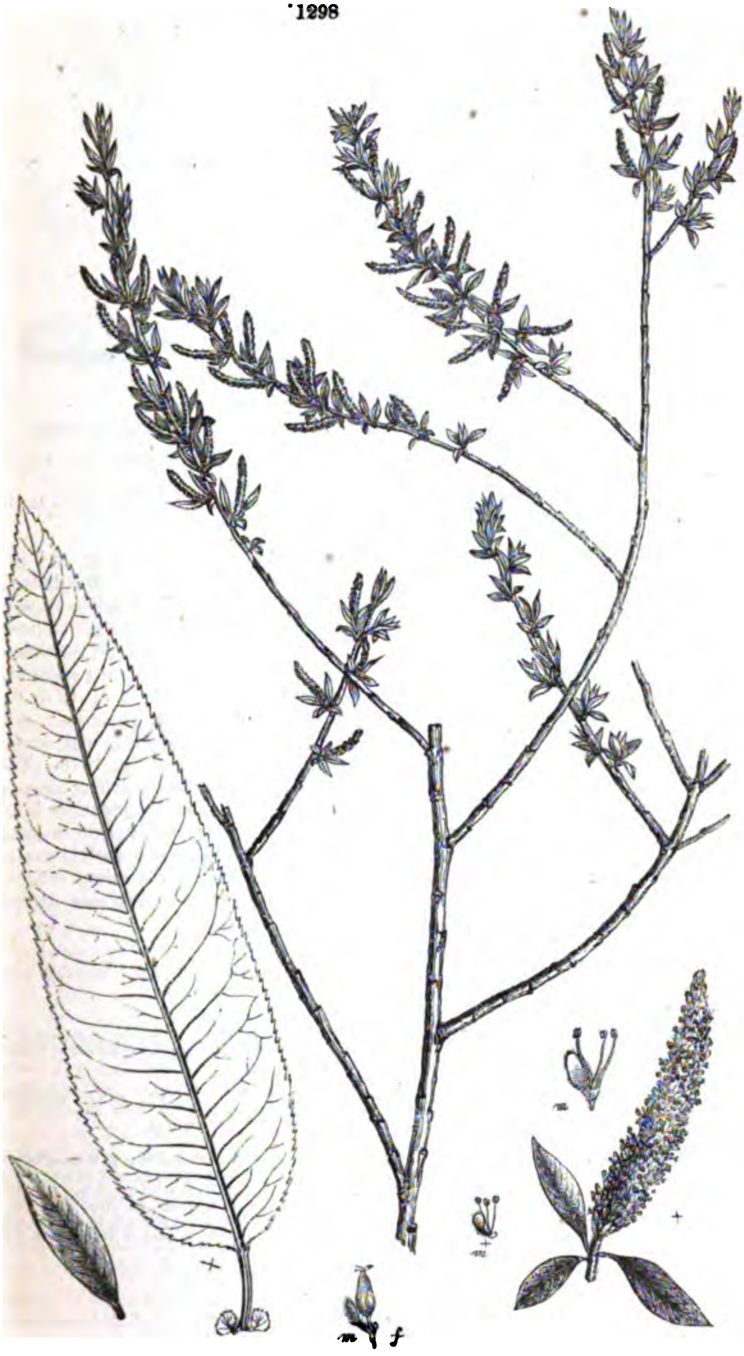
Spec. Char., &c. Leaves ovate-oblong, serrated, smooth, slightly rounded at the base. Stamens 3. Ovary stalked, ovate, compressed, glabrous. Stigmas nearly sessile. (*Smith E. F.*) The male plant is a native of Britain, on the sides of streams, in Sussex, where it forms a much-branched shrub, or crooked tree, scarcely ever exceeding 12 ft. high; flowering in May. Mr. Forbes states that his plant, after having been cultivated for five years, had not exceeded the height of 5 ft. There are plants in the Goldworth Arboretum, and at Henfield.

⚲ 14. *S.* AMYGDA'LINA *L.* The Almond-*leaved* Willow, *or Osier.*

Identification. Lin. Sp. Pl., 1443.; Willd. Sp. Pl., p. 656.; Smith Eng. Bot., t. 1636.; Eng. Fl., 4. p. 169.; Forbes in Sal. Wob., No. 18.; Hook Br. Fl., ed. 3., p. 420.; Wade's Salices, p. 14.; Mackay Fl. Hibern., pt. 1. p. 245.
Synonyme. *S.* amygdálina, part of, *Koch Comm.*, p. 18.
The Sexes. Both sexes are figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1636.; Sal. Wob., No. 18.; our *fig.* 1298.; and *fig.* 18. in p. 1606.

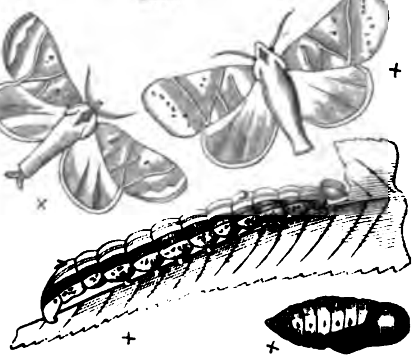
Spec. Char., &c. Leaves ovate, serrated, glabrous, rounded, and unequal at the base. Stamens 3. Ovary ovate, compressed, smooth; its stalks almost as long as the bractea. Stigmas nearly sessile. Young branches furrowed. Down of the seeds shorter, and less abundant, than in *S.* triándra. Mr. Crowe first accurately compared and distinguished these two by their leaves. (*Smith E. F.*) A native of Britain, on the banks of rivers and ditches, in the eastern counties of England, and in Scotland, where it forms a tree growing to the height of 20 ft. or 30 ft.; flowering in April and May, and, for the second time, in August. "If cut down every year, it produces rods 6 ft. or 8 ft. long, in considerable plenty, for coarse basket-work, but not equal to *S.* triándra when peeled." (*Smith.*) Among the insects which live upon this species is the *Phalæ'na* anastomòsis *L.*, the

1298



Mocca-stone moth (*Smith and Abbott's Insects*, t. 72.; and our *fig.* 1299.) The caterpillars of this insect appear all collected together in a web spun among the leaves. The larva is of a bright yellow, streaked with brown, and the imago of a pale brown. The insect is equally common in Europe and in America. There are plants in the Twickenham Botanic Garden, and the Hackney arboretum; and at Woburn, Henfield, and Flitwick.

1299



♀ 15. *S.* VILLARSIA'NA Flügge et Willd. Villars's Willow, *or Osier.*

Identification. Flügge in Litt., quoted in Willd. Sp. Pl., 4. p. 655.; Smith in Rees's Cycl., No. 63.; Forbes in Sal. Wob., No. 17.
Synonymes. S. triándra *Villars Delph.*, 3. p. 762.; *S. amygdálina* var. *Koch Comm.*, p. 19.
The Sexes. Both sexes are described by Willd.; the male is figured in *Sal. Wob.*, and is in the London Horticultural Society's arboretum.
Engravings. Sal. Wob., No. 17.; and *fig.* 17. in p. 1606.

Spec. Char., &c. Leaves elliptical, rounded at the base, pointed at the tip, serrated, whitely glaucous beneath. Catkins appearing with the leaves. Flowers triandrous. Ovary pedicellated, ovate, smooth. Stigmas sessile. (*Willd.* and *Forbes.*) A native of Dauphiné, where, according to Willdenow, it forms a shrub 5 ft. or 6 ft. high, with dark violet-coloured, shining branches; but, according to the experience of Mr. Forbes, in the Woburn salictum, it is a handsome upright-growing tree, attaining the height of 12 ft. or 14 ft., with the preceding year's branches of a greyish brown colour, and the young twigs dark brown above, paler beneath, polished, and somewhat angular, or striated, and very brittle. Introduced in 1818. The male, as observed in the London Horticultural Society's arboretum, in 1835, is an elegant kind, noticeable early in spring for its plentiful blossoms, and subsequently for its leaves, which are remarkably neat in their figure and serrature, and more or less peculiar as compared with those of kindred kinds. The dark colour of the shoots of the preceding year or years is also an ornamental feature. There are plants at Woburn Abbey, Henfield, and Flitwick House.

App. i. *Triándræ of which there are Plants in the Country not described.*

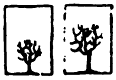
S. *tenuifòlia* Lodd. Cat., ed. 1836, and S. *tenuifòlia* G., in the collection at Hackney, appear to be the same, and near akin to *S.* lanceolàtum; but are very different from the *S.* tenuifòlia of *Smith.*

App. ii. *Triándræ described, but not yet introduced, or of doubtful Identity with Species in the Country.*

S. *spectábilis*, mas et fem., Host Sal. Aust., 1. p. 1. t. 3, 4., Fl. Aust., 2. p. 632.; S. *semperflòrens*, mas et fem., Host Sal. Aust., 1. p. 2. t. 5, 6., Fl. Aust., 2. p. 633.; S. *tenuiflòra*, mas et fem., Host Sal. Aust., 1. p. 2. t. 7, 8., Fl. Aust., 2. p. 633.; S. *venústa*, mas et fem., Host Sal Aust., 1. p. 3. t. 9, 10., Fl. Aust., 2. p. 633.; S. *vària*, mas et fem., Host Sal. Aust., 1. p. 3. t. 11, 12., Fl. Aust., 2. p. 634.; S. *amygdálina*, mas et fem., Host Sal. Aust., 1. p. 4. t. 13, 14., Fl. Aust., 2. p. 634.; S. *ligústrina*, mas et fem., Host Sal. Aust., 1. p. 4. t. 15, 16., Fl. Aust., 2. p. 634.; S. *speciòsa*, mas et fem., Host Sal. Aust., 1. p. 5. t. 17., Fl. Aust., 2. p. 635.

Group iv. *Pentándræ* Borrer.

Trees having Flowers with 3—5 Stamens.



Stamens in a flower more than 3, in most instances 5. Ovary glabrous. The plants trees of moderate size. Leaves large, glossy, fragrant, serrated, and having glands in the serratures, from which a resin exudes. Stamens in each catkin so numerous and long, as to render the flowers, which, too, are in perfection at the same time as the foliage, quite handsome, and the trees, in this condition, more ornamental than those of any other group. (*Hook. Br. Fl.*, ed. 2., with adaptation.)

₮ 16. *S.* PENTA'NDRA *L.* The five-stamened-*flowered* Willow.

Identification. Lin. Sp. Pl., 1442.; Willd. Sp. Pl., 4. p. 658.; Hayne Abbild., p. 221.; Smith Eng. Bot., t. 1805.; Eng. Fl., 4. p. 171.; Forbes in Sal. Wob., No. 34.; Hook. Br. Fl., ed. 3., p. 420.; Wade's Salices, p. 36.; Mackay Fl. Hibern., pt. 1. p. 246.; Host Sal. Austr., 1. p. 1.
Synonymes. *S.* pentándra, part of, *Koch Comm.*, p. 13.; the sweet Willow, or Bay-leaved Willow.
The Sexes. Both sexes are figured in *Sal. Wob.* and Hayne's *Abbild.*, and the male in *Eng. Bot.*, with two views of an ovary. Both sexes are figured in Host's *Sal. Austr.*
Engravings. Eng. Bot., t. 1805.; Hayne Abbild., t. 161.; Sal. Wob., No. 34.; Host Sal. Austr., 1. t. 1. f. 2.; our *fig.* 1299. *a*; and *fig.* 34. in p. 1610.

Spec. Char., &c. Leaves ovate, pointed, crenate, glandular, glabrous. Footstalks glandular at the summit. Stamens 5 or more, hairy at the base. Ovary ovate, tapering, smooth, nearly sessile. (*Sal. Wob.*, p. 67.) A native of Britain, on the banks of rivers and watery places; most frequent in the north. In 1804, this, and five or six other distinct sorts were abundant on the banks of Gogar Burn, near Edinburgh, between Gogar House and the junction of the burn with the river Almond. It forms an upright tree, 18 ft. or 20 ft. high, with smooth shining branches, and large, copious, shining foliage, so as to give the plant, in the summer season, the appearance of an evergreen. It is one of the latest-flowering willows, the flower seldom expanding till the beginning of June. The flowers are remarkably fragrant, as are the leaves, especially when bruised: the fragrance, which is similar to that of the sweet bay (*Laúrus nóbilis*), but less powerful, is exuded



1299 *a*

from the resinous notches of the leaves, and from the barren catkins. It is one of the most desirable species of the genus for planting in pleasure-grounds, on account of the fine display made by the blossoms, their abundant fragrance, the smooth, shining, rich deep green of the leaves, and the comparatively slow growth and compact habit of the tree. Mr. Forbes states that, when cut down, this species produces tough flexible rods, fit for basketwork; but, in a wild state, on the banks of Gogar Burn, where its five or six other sorts were periodically cut down for basketwork and for hoops, the shoots of *S.* pentándra were considered rather short and brittle, as compared with those of the others. *Phalæ'na* typicöides, the Gothic moth, which, Donovan (in his *Insects*, &c., vol. xv. p. 2. pl. 505.) says, is much esteemed by collectors in Britain, on account of its scarceness, inhabits this willow. Notwithstanding its being generally rare, it appears that it was seen in 1826, in Cheshire, in immense quantities, during a thunder storm. (See *Mag. Nat. Hist.*, vol. iii., p. 404.) There are several plants in the Horticultural Society's Garden, which, in 1834, after having been 10 years planted, were from 15 ft. to 18 ft. high; and others in the Hackney and Goldworth arboretums, and at Flitwick, Henfield, and Woburn.

Variety.

₮ S. *p.* 2 *hermaphrodítica*; *S.* hermaphrodítica *Lin. Sp. Pl.*, p. 1442.,

Wahlenb. Flora Ups., according to *Koch Comm.*, p. 14., *Smith* in *Rees's Cyclo.*, No. 1. — The catkins bearing rarely male flowers and female ones, and some of the stamens being changed into monstrous pistils.

☨ 17. *S.* MEYERIA'NA Willd. Meyer's Willow.

Identification. Willd. Berl. Baumz., p. 427.; Hayne Abbild., p. 222.; Forbes in Sal. Wob., No. 33.; Hook. Br. Fl., ed. 3., p. 421.

Synonymes. Koch, in his *Comm.*, p. 14., has presented the following: — "*S.* cuspidàta *Schultz Fl. Starg. Suppl.*, p. 47.; *S.* tinctòria *Smith* in *Rees's Cyclo.*, No. 13.; *S.* pentándra β *Linn. Fl. Suec.*, according to Smith; *S.* hexándra *Ehrh. Arb.*, 140.; *S.* Ehrhartiàna Smith in *Rees's Cyclopædia.*" Koch has adopted the name *S.* cuspidàta *Schultz.* *S.* tetrándra *Willd.* is quoted as synonymous in *Hook. Br. Fl.*, ed. 3.

The Sexes. The male is figured in Hayne's *Abbild.*, and described and figured in *Sal. Wob.*, unless some mistake as to the kind has occurred: see Borrer, below. The female is mentioned in Koch's *Com.*, and Hooker's *Br. Fl.*, ed. 3., p. 421.

Engravings. Hayne Abbild., t. 162.; Sal. Wob., No. 33., with a doubt, at least, as to the flower-bearing specimen; our *fig.* 1300.; and *fig.* 33. in p. 1610.

Spec. Char., &c. Leaves ovate-elliptic, pointed, glabrous, green, and shining above, rather pale beneath, but not glaucous, serrated; the serratures of the young leaves glandular. Stipules soon falling off. Stamens 3—4. Bractea obtuse, yellow. (*Sal. Wob.*, p. 65.) Koch has stated the geographic distribution of *S.* cuspidàta *Schultz*, to which he refers the *S.* Meyeriàna Willd., to be Pomerania and Sweden, in meadows, and woody and marshy places. Germany is given as the native country of this kind in our *Hortus Britannicus*, and in Sweet's: and the date of its introduction into Britain is, in the former, 1822; in the latter, 1823. Mr. Borrer states that the insertion of this kind in *Hook. Br. Fl.*, ed. 3., as a native of Britain, arose from a mistake of his. (See Borrer in *Comp. to Bot. Mag.*, p. 225.) It forms a handsome-growing tree, with brownish smooth branches, which are slightly warty; and large, broad, shining leaves, somewhat unequal, and obtuse at the base, often broadest above the middle: of an ovate-elliptic shape, pointed; green, smooth, and shining above; pale, but not glaucous, beneath; strongly serrated, and the serratures of the younger leaves furnished with glands. Nearly allied to *S.* lùcida, which, however, has smaller leaves, and longer, more slender, catkins. It flowers in April. *S.* Meyeriàna is a desirable kind of willow for introducing into ornamental plantations of the coarser kind, as it grows quickly, and has large shining leaves, and the catkins of flowers of the male are ornamental. It assimilates to *S.* pentándra in its flowers, but is obviously distinct from that kind when the two are seen growing near together. It is of freer growth, is more robust, and its leaves are longer, narrower, and more shining. Mr. Borrer has communicated the following remarks relative to the figure of *S.* Meyeriàna, given in *Sal. Wob.*, No. 33.: — "I never saw the catkins sessile, as represented in *Sal. Wob.*, t. 33., but always on leafy stalks, as in *S.* lùcida, t. 32. Possibly the two figures represent the same species. In American specimens of *S.* lùcida *Mühl.* and *Willd.*, there is some silkiness on the young leaves. Still they may be of the same species as *S.* Meyeriàna; and, if so, *S.* lùcida is the older name." There are plants at Woburn Abbey, at Henfield, and at Flitwick House, the latter of which are 13 ft. high.

☨ 18. *S.* LU'CIDA *Mühlenb.* The shining-*leaved* Willow.

Identification. Mühlenb. Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 239. t. 6. f. 7.; Willd. Sp. Pl., 4. 667.; Mühlenb. Sims et Kön. Ann. of Bot., 2. 66. t. 5. f. 7.; Pursh Fl. Amer. Sept., 2. p. 615.; Smith in Rees's Cyclo., No. 32.; Michx. North Amer. Sylva, 3. p. 81.; ? Forbes in Sal. Wob., No. 32., who has quoted Willd. with doubt.

Synonymes. *S.* Forbèsii Sweet Hort. Brit., ed. 1830; where it is stated to be not the *S.* lùcida of others, and where the *S.* lùcida of *Spreng. Syst.*, which is the *S.* lùcida *Mühlenb.*, is registered besides.

The Sexes. The male is described and figured in *Sal. Wob.*, and noticed below, in the *Specific Character*.

Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 7.; Sims et Kön. Ann. of Bot., 2. t. 5. f. 7.; Michx. North Amer. Sylva, 3. t. 125. f. 3.; ? Sal. Wob., 32.; our *fig.* 1301.; and *fig.* 32. in p. 1610.

Spec. Char., &c. Leaves ovate, acuminate, serrated, glabrous; shining above, pale beneath; the serratures resinous. Footstalks glandular. Stipules large, half-heart-shaped, serrated, and furnished with glands. Catkins of the male



1300

1301

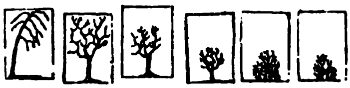


1½ in. long, or more. Stamens 3—5, bearded at the base. (*Sal. Wob.*, p. 63.) Mr. Forbes believes that the kind which he has elucidated is a native of Switzerland; but the *S.* lùcida *Mühlenb.* is a native of North America; and this may be one reason, at least, why Mr. Sweet distinguished the plants of the two countries as of two species, as shown under *Synonymes*, above. *S.* lùcida of the *Salictum Woburnense* forms a handsome low-growing tree, with the branches of the preceding year of a greyish green colour, and smooth: the young twigs are of a yellowish green, somewhat striated, or angular, at the points. It flowers in April and May, and "appears a good

basket willow." Mr. Forbes received it from Messrs. Loddiges, under the name of *S.* Meyeriàna; which species, he says, is readily distinguished from *S.* lùcida by its much larger leaves, and shorter obtuse catkins. There are plants in the Goldworth Arboretum, and in the salictum at Woburn.

Group v. *Frágiles* Borrer.

Trees, with their Twigs mostly brittle at the Joints.



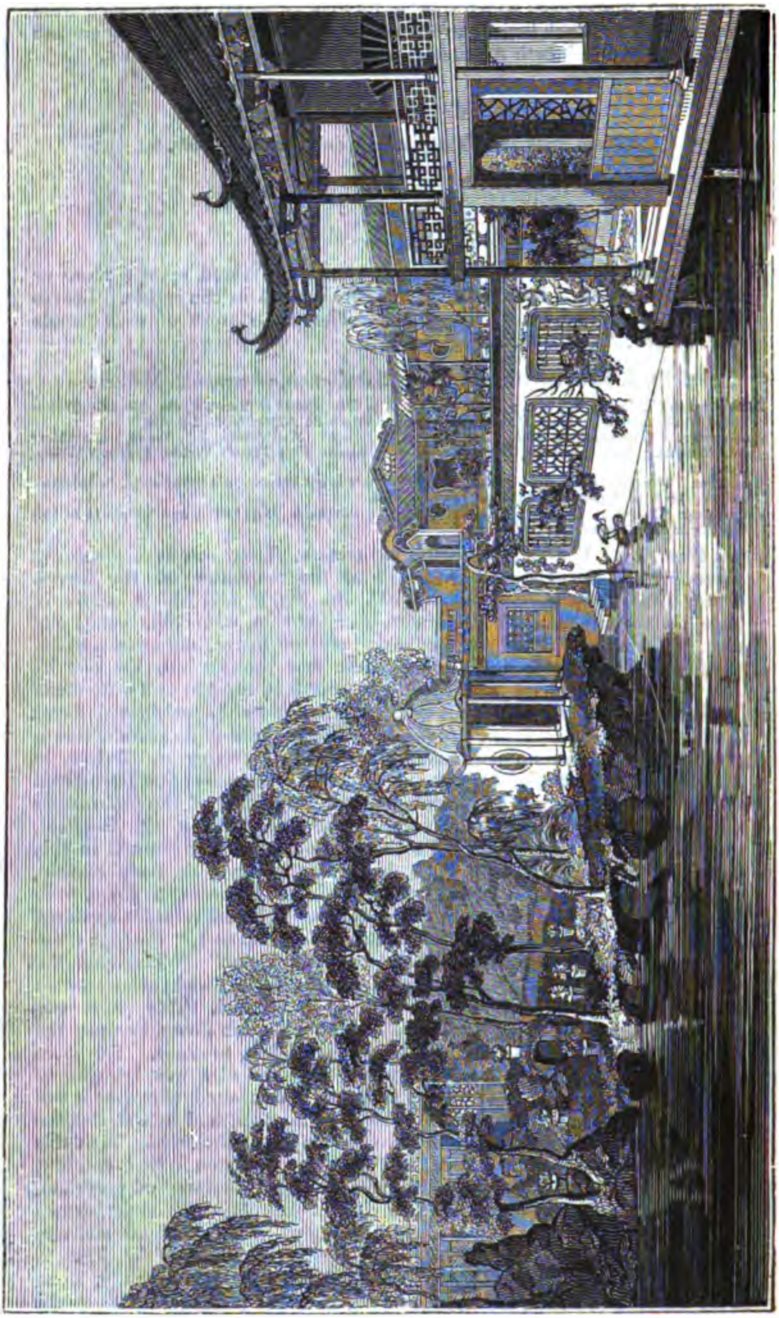
Stamens 2 to a flower. Ovary glabrous, elongated, seated upon a more or less obvious stalk. Flowers very loosely disposed in the catkin. Leaves lanceolate, serrated, glabrous, stipuled. The plants, trees of considerable size. (*Hook. Br. Fl.*, ed. 2., adapted.)

♀ 19. *S.* BABYLO'NICA *L.* The Babylonian, *or weeping*, Willow.

Identification. Lin. Sp. Pl., 1443.; Willd. Sp. Pl., 4. p. 671.; Smith in Rees's Cyclo., No. 42.; Forbes in Sal. Wob., No. 22.; Koch Comm., p. 17., note; Pursh Fl. Amer. Sept., 2. p. 614.
Synonymes. *S.* propéndens *Sering. Sal. Hel.*, p. 73. (*Koch*); *S.* orientàlis, &c., *Tourn.*; *S.* arábica, &c., *C. Bauh.*; Saule pleureur, Parasol du grand Seigneur, *Fr.*; Trauer Weide, Thränen Weide, *Ger.*
The Sexes. The female is figured in *Sal. Wob.*; the male is not known, in a living state, in Britain unless it be *S.* b. Napoleòna, as suggested in p. 1513.
Engravings. Rauw. It., 25. 183.; Sal. Wob., No. 22.; our *fig.* 22. in p. 1607.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves lanceolate, acuminate, finely serrated, glabrous; glaucous beneath. Catkins protruded at the same time as the leaves. Ovary ovate, sessile, glabrous. (*Willd. Sp. Pl.*, 4 p. 671.) A native of Asia, on the banks of the Euphrates, near Babylon, whence its name; and also of China, and other parts of Asia; and of Egypt, and other parts of the north of Africa. It is said to have been first brought into England by Mr. Vernon, a merchant at Aleppo, who sent it to his seat at Twickenham Park, at about 1730, where it was seen growing by the celebrated Peter Collinson, in 1748. In the *Hortus Kewensis*, the date of its introduction is given as 1692; but no particulars are stated respecting it. Delille, in a note to his *L'Homme des Champs*, says that Tournefort first introduced it into Europe; and some authors, on the authority of the *St. James's Chronicle* for August, 1801, assert that Pope introduced it into England, and that his favourite tree at Twickenham was the first planted in this country. The story is, that Pope, happening to be with Lady Suffolk, when that lady received a present from Spain, or, according to some, from Turkey, observed that some of the pieces of withy bound round it appeared as though they would vegetate; and, taking them up said, "Perhaps these may produce something that we have not in England." Whereupon, the story adds, he planted one of them in his garden at Twickenham; which became the weeping willow, afterwards so celebrated. This paper was published about the time that Pope's willow was cut down, because the possessor of his villa was annoyed by persons asking to see it. The most probable of these stories appears to be, that the tree was brought to Europe by Tournefort. It is now universally cultivated wherever it will stand the open air, not only in Europe, but in Asia, and in the civilised parts of Africa: it is also a great favourite in North America. That this tree is a favourite one in China, and also very common in that country, appears from the frequent representations of it that are found on porcelain, tea-chests, &c. It is also pictured in a view of the village of Tonnan, drawn by John Nicohoff, July 3. 1655, on his way to Pekin, with the embassy which the Dutch sent to the Emperor of China in that year. (*Syl. Flor.*, 2. p. 265:) That the Chinese use it in their planted garden scenery, along with other ornamental trees, is evident, from the published views of the

1302



gardens and villas of Canton, and other places in China. *Fig.* 1302., which is reduced from a drawing kindly lent us by Sir G. T. Staunton, shows part of the villa of Consequa, who had one of the finest gardens in Canton about the year 1812, when the drawing was taken. A large weeping willow is shown in the left of the picture, two or more in the middle, and one on the right, as if placed on a balcony; or perhaps growing through it from the conservatory below. The Chinese employ the weeping willow also in their cemeteries, as appears from *fig.* 1304., reduced from a plate in Dobell's *Travels*, which represents the cemetery of the Vale of Tombs, near the lake See Hoo. All the prints of Chinese objects, indeed, concur in showing that the weeping willow is one of the most generally admired trees in China. It is common in gardens in the neighbourhood of Algiers, and in burial-grounds throughout Turkey, and great part of the west of Asia. In many countries, particularly in France and Germany, it appears to have taken the place of the cypress, as a tree for planting in cemeteries; and the reasons why it is preferred for this purpose are thus given by Poiret in the *Nouveau Du Hamel:* — "The cypress was long considered as the appropriate ornament of the cemetery; but its gloomy shade among the tombs, and its thick heavy foliage of the darkest green, inspire only depressing thoughts, and present death under its most appalling image. The weeping willow, on the contrary, rather conveys a picture of the grief felt for the loss of the departed, than of the darkness of the grave. Its light and elegant foliage flows like the dishevelled hair and graceful drapery of a sculptured mourner over a sepulchral urn; and conveys those soothing, though softly melancholy, reflections, which have made one of our poets exclaim, 'There is a pleasure even in grief.'" Notwithstanding the preference thus given to the willow, the shape of the cypress, conveying, to a fanciful mind, the idea of a flame pointing upwards, has been supposed to afford an emblem of the hope of immortality, and is still planted in many churchyards on the Continent, and alluded to in epitaphs under this light. In many of the churchyards of Germany, both emblems are combined; the Lombardy poplar being substituted for the cypress; as, indeed, we are informed it is in many of the cemeteries in Turkey and Persia. *Fig.* 1303. represents a churchyard in Baden, called the

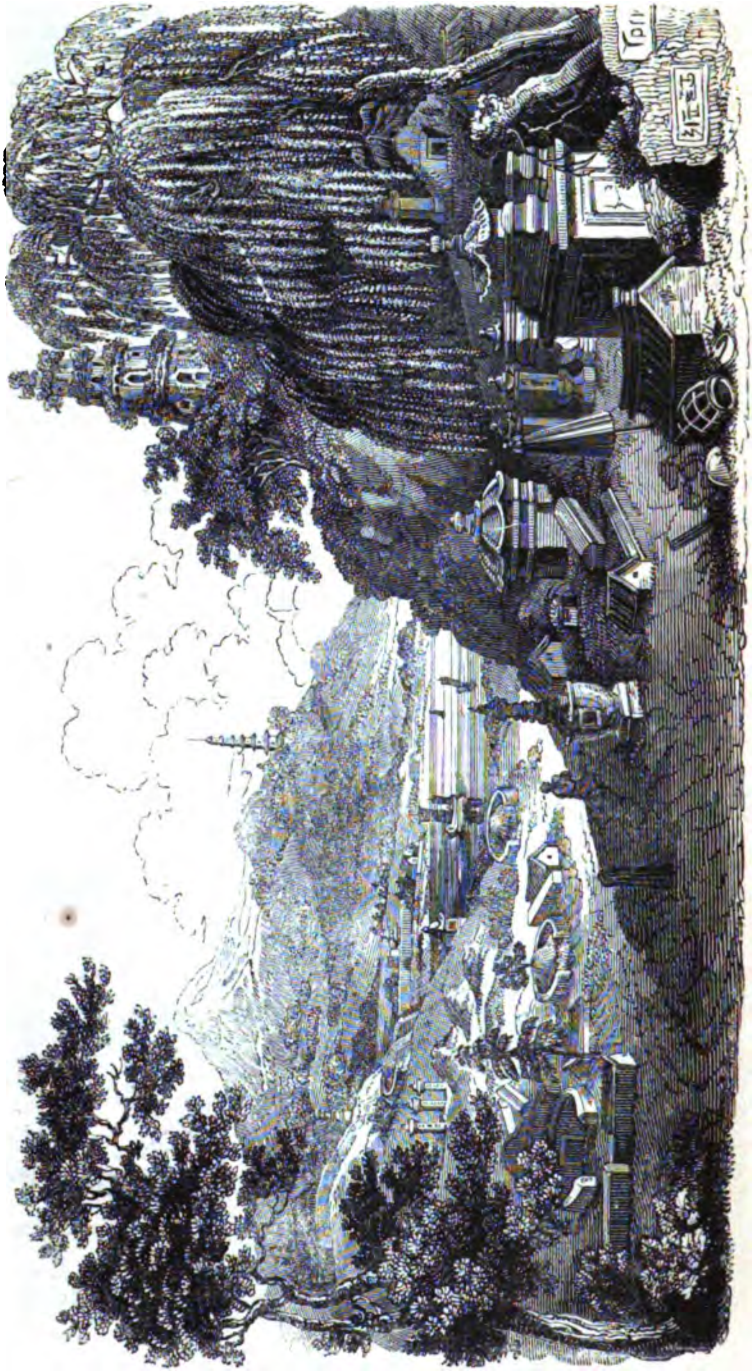
1303



Oehlberg (Mount of Olives), where the two trees are both planted, so as to produce a very pleasing effect.

Much has, of late years, been said respecting a weeping willow in the Island of St. Helena, supposed to overhang the tomb of Napoleon. Accord-

1304



ing to some, this is a distinct species, indigenous to the island; and others even assert that it is not a willow at all. Being anxious to procure correct information as to the tree at St. Helena, we sent a letter to the *Morning Chronicle*, which appeared in that journal on Sept. 5. 1836. We received a great many answers; some dried specimens; a number of drawings and engravings, either lent or given; and one living plant. The result of the whole, as far as it is worth making public, is as follows:— No species of willow is indigenous to St. Helena; but about 1810, or before, when General Beatson was governor there, he, being fond of planting, had a great many forest trees and shrubs introduced from Britain; and though, as appears by the *St. Helena Gazette* for 1811–12, he had the greatest difficulty in preserving his plantations from the numerous goats which abounded in the island, yet several of the trees survived, and attained a timber-like size. Among these was the tree of Sàlix babylónica, which has since been called Napoleon's willow. This tree grew among other trees, on the side of a valley near a spring; and, having attracted the notice of Napoleon, he had a seat placed under it, and used to go and sit there very frequently, and have water brought to him from the adjoining fountain. About the time of Napoleon's death, in 1821, a storm, it is said, shattered the willow in pieces; and, after the interment of the emperor, Madame Bertrand planted several cuttings of this tree on the outside of the railing which surrounds the grave; and placed within it, on the stone, several flower-pots with heartsease and forget-me-not. In 1828, we are informed, the willows were found in a dying state; and twenty-eight young ones were, in consequence, placed near the tomb, which was at that time surrounded with a profusion of scarlet-blossomed pelargoniums. A correspondent, who was at St. Helena in 1834, says one of the willows was then in a flourishing condition; but another, who was there in 1835, describes it as going fast to decay, owing to the number of pieces carried away by visitors. In what year a cutting from this willow was brought to England for the first time we have not been able to ascertain; but it appears probable that it may have been in the year 1823, and that one of the oldest plants is that in the garden of the Roebuck tavern on Richmond Hill, which, as it appears by the inscription on a white marble tablet affixed to it, was taken from the tree in that year. Since that period, it has become fashionable to possess a plant of the true Napoleon's willow; and, in consequence, a great many cuttings have been imported, and a number of plants sold by the London nurserymen. There are now trees of it in a great many places. There is a handsome small one in the Horticultural Society's Garden; one at Kew; several at Messrs. Loddiges's; some in the Twickenham Botanic Garden; one in the garden of Captain Stevens, Beaumont Square, Mile End; one in the garden of Mr. Knight, at Canonbury Place, Islington, brought over in 1824; one in the garden of No. 2. Lee Place, Lewisham, Kent; one in the garden of No. 1. Porchester Terrace; one in the garden of S. C. Hall, Esq., Elm Grove, Kensington Gravel Pits; one, a very flourishing and large tree, in the garden of Mrs. Lawrence, Drayton Green; one at Clayton Priory, near Brighton; one at Allesley Rectory, near Coventry; several at Chatsworth; and there are various others in the neighbourhood of London, and in different parts of the country. In ornamental plantations, the weeping willow has the most harmonious effect when introduced among trees of shapes as unusual as its own; partly of the same kind, as the weeping birch, and partly of contrasted forms, as the Lombardy poplar; and the effect of these three trees is always good when accompanied by water, either in a lake, as in *fig.* 1305., or in a stream and waterfall, as in *fig.* 1306. Both these views are of scenery in the park at Monza. (See *Encyc. of Gard.*, ed. 1835, p. 36.) *Fig.* 1037. is an example of the use of trees having drooping branches, and others having vertical branches, such as the Lombardy poplar, in contrasting with and harmonising horizontal lines. (See *Gard. Mag.*, vol. i. p. 117.) For further remarks on the use of the

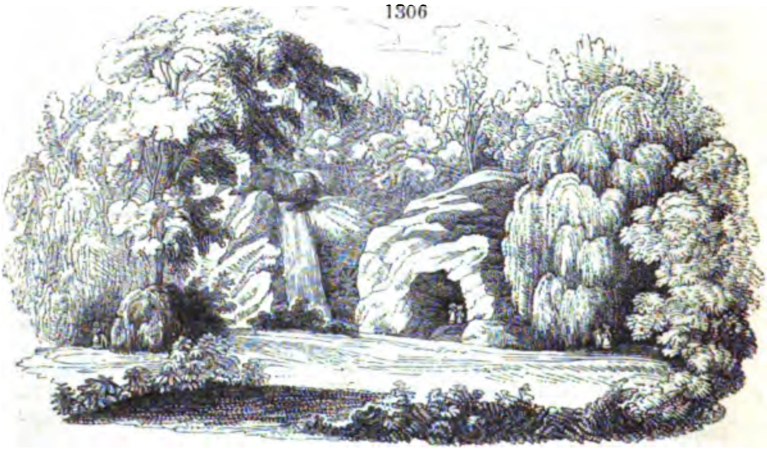
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weeping willow along with the Lombardy poplar, see *Pópulus fastigiàta* in a future page.

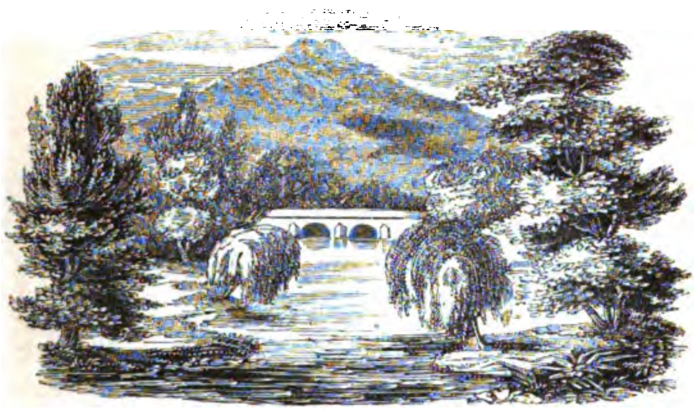
A large weeping willow, in a scene in which there are no other trees at all harmonising with it by their form, however beautiful it may be in itself, always more or less injures the landscape. In Gilpin's *Forest Scenery*, he remarks that the " weeping willow is a very picturesque tree, and a perfect contrast to the Lombardy poplar. The light airy spray of the poplar," he adds,

1306



" rises perpendicularly : that of the weeping willow is pendent. The shape of its leaf is conformable to the pensile character of the tree ; and its spray, which is lighter than that of the poplar, is more easily put in motion by a breath of air. The weeping willow, however, is not adapted to sublime subjects. We wish it not to screen the broken buttresses and Gothic windows of an abbey, or to overshadow the battlements of a ruined castle. These offices it resigns to the oak, whose dignity can support them. The weeping willow seeks an humbler scene ; some romantic footpath bridge, which it half conceals, or some glassy pond, over which it hangs its streaming foliage,—

1307



——— 'and dips
Its pendent boughs, stooping as if to drink.' COWPER.

In these situations it appears in character, and, of course, to advantage." Sir Thomas Dick Lauder remarks on this tree, that it is a native of the East, and that interesting associations are awakened in conjunction with it by that very beautiful Psalm, "By the waters of Babylon we sat down and wept, when we remembered thee, O Sion! As for our harps, we hanged them up upon the willow trees that are therein." (Psalm 137.) "The tender and melancholy recollections of the captive children of Israel, when taken in conjunction with this tree," he adds, "are of themselves sufficient to give it an interest in every human bosom that may have been touched by the strains of the Psalmist." (*Lauder's Gilpin*, vol. i. p. 135.)

The weeping willow roots freely by cuttings, and grows with great rapidity in a rich soil, within reach of water, in the climate of London; but, in the north, the young shoots are very apt to be killed by frost. These shoots are brittle, and neither they nor the wood are ever applied to any useful purpose. The weeping willow is particularly subject to the attacks of the Curcùlio lápathi *Lin.*, Cryptorhýnchus *Fab.*, and other insects, as already pointed out in our general view of the genus Sàlix. (p. 1478.)

A curious instance is given in the *Gardener's Magazine*, vol. ix. p. 267., of a weeping willow in the Botanic Garden at Carlsruhe. This willow, which was planted in 1787, was nearly thrown down by a storm in 1816; and, in consequence of the injury it received, one branch was cut off, and an oaken prop was put under the other, as represented in *fig.* 1308. *a.* The willow sent down a root under the decayed bark of the oaken prop. This root in 1829, when we saw it, being increased to about the thickness of a man's arm, had burst from the bark; which being removed the root stood alone, as shown at *b*; and we are informed that it has since so increased in size and strength as to render the oaken prop unnecessary.

Varieties. There is one very decided variety, commonly treated as a species, under the name of *S.* annulàris; and Mr. Castles of the Twickenham Botanic Garden is of opinion that, exclusive of this variety, there are two forms of the species in the country, one of which he thinks may possibly be the male plant. This form, as it appears to be the same as the plant sent from St. Helena, we shall, till something further has been decided respecting it, call it *S.* b. Napoleòna. The varieties will, therefore, stand as under: —

1308



♀ S. *b.* 1 *vulgàris fœm.* Hort. has pale green young shoots, slender, with an angular twist above the axil of each leaf, and large stipules. It is the most common weeping willow in the neighbourhood of London, and flowers in June.

♀ S. *b.* 2 *Napoleòna Hort.* has round shoots, generally reddish, and the leaves are without stipules. It is of very vigorous growth; and there "are a number of plants of this kind in a brickfield close to the Lunatic Asylum at Hanwell; one at the Marsh Gate, Richmond, near the Poorhouse; and one at the Ferry, near Ham House. Mr. Castles's son, Mr. George Castles, says there are also some by the canal side, near Brentford." The tree at Richmond, when measured for us in November 1836, was 60 ft. high, and the diameter of the trunk was 3 ft. 3 in.

♀ S. *b.* 3 *críspa* Hort.; *S.* annulàris *Forbes* in *Sal. Wob.*, No. 21., with a fig. of the female; our *fig.* 21. in p. 1606.; and the plate of this tree in our last Volume. *The* ring-leaved *Willow.* — Leaves lanceolate, acuminate, serrated, curled, or twisted, glabrous, and glaucous beneath. Young twigs erect, pubescent at the points. Stipules half-heart-shaped. Ovary ovate, glabrous, and sessile. Stigmas notched. (*Sal. Wob.*, p. 41.) The preceding year's branches are pendulous. A garden production, of uncertain origin, easily distinguished from the common weeping willow (*S.* babylónica), by the crowded mass of its young twigs, and its curled leaves. The tree does not appear as though it would attain the same height as the species. The catkins of the ring-leaved willow appear in May. The plant of this variety in the Horticultural Society's Garden, and figured in our last Volume, was, in 1834, 17 ft. high.

Statistics of the Species. Sàlix babylónica in the Environs of London. There are many immense trees on the banks of the Thames, and in villa gardens where the soil is moist, from 50 ft. to 60 ft. high, with heads 60 ft. or 80 ft. in diameter. In the Horticultural Society's Garden, in 1834, two trees, 8 years planted, were 18 ft. high. At Mount Grove, Hampstead, 4 years planted, it is 12 ft. high.

Sàlix babylónica South of London. In Devonshire, in Bystock Park, 12 years planted, it is 24 ft. high; at Endsleigh Cottage, 10 years planted, 20 ft. high. In Dorsetshire, at Melbury Park, 20 years

planted, it is 31 ft. high. In the Isle of Jersey, in Saunders's Nursery, 10 years planted, it is 30 ft. high. In Somersetshire, at Nettlecombe, 24 years planted, it is 34 ft. high. In Surrey, at Claremont, it is 30 ft. high; the diameter of the trunk 1 ft. 9 in., and of the head 45 ft.

Sàlix babylónica North of London. In Berkshire, at Bear Wood, 10 years planted, it is 20 ft. high. In Buckinghamshire, at Temple House, 40 years planted, it is 30 ft. high. In Denbighshire, at Llanbede Hall, 44 years planted, it is 54 ft. high. In Oxfordshire, in the Oxford Botanic Garden, 12 years planted, it is 30 ft. high. In Pembrokeshire, at Golden Grove, 50 years planted, it is 20 ft. high; the diameter of the trunk 1½ ft., and of the head 20 ft. In Radnorshire, at Maeslaugh Castle, 50 years planted, it is 42 ft. high. In Suffolk, in the Bury Botanic Garden, 10 years planted, it is 26 ft. high; at Finborough Hall, 70 years planted, it is 70 ft. high; the diameter of the trunk 3½ ft., and of the head 54 ft. In Warwickshire, at Combe Abbey, 10 years planted, it is 24 ft. high. In Worcestershire, at Hagley, 10 years planted, it is 20 ft. high; at Croome, 70 years planted, it is 50 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft. In Yorkshire, at Grimston, 30 years planted, it is 25 ft. high.

Sàlix babylónica in Scotland. At Hopetoun House, near Edinburgh, 16 years planted, it is 20 ft. high; the diameter of the trunk 8 in., and of the head 24 ft. In Fifeshire, at Danibristle Park, 10 years planted, it is 8 ft. high. In Perthshire, at Taymouth, 36 years planted, it is 70 ft. high; the diameter of the trunk 3½ ft., and of the head 60 ft. In Stirlingshire, at Callender Park, 5 years planted, it is 16 ft. high.

Sàlix babylónica in Ireland. Near Dublin, at Terenure, 50 years planted, it is 35 ft. high. In Galway, at Coole, it is 50 ft. high; the diameter of the trunk 2½ ft., and of the head 60 ft.

Sàlix babylónica in Foreign Countries. In France, near Paris, at Scéaux, 40 years planted, it is 50 ft. high; the diameter of the trunk 3 ft., and of the head 60 ft. In Austria, at Vienna, in the University Botanic Garden, 50 years planted, it is 20 ft. high; the diameter of the trunk 10 in., and of the head 12 ft.: in Baron Loudon's garden, at Hadersdorf, near the tomb of the celebrated Marshal Loudon, 12 years planted, it is 14 ft. high: at Brück on the Leytha, 50 years planted, it is 40 ft. high; the diameter of the trunk 3 ft., and of the head 48 ft. In Prussia, near Berlin, at Sans Souci, 40 years old, it is 24 ft. high; the diameter of the trunk 9 in., of the head 7 ft. In the south of Russia, the tree is met with in the gardens of some noblemen, and in the government garden at Nikitka. In Italy it is frequent. In the burial-grounds of Turkey it is common; and it may be found in various parts of India, and even in China. It is commoner in almost every other country than in its native habitat, the banks of the Euphrates.

☨ 20. *S.* DECI'PIENS *Hoffm.* The deceptive, *White Welch, or varnished,* Willow.

Identification. Hoff. Sal., 2. p. 2. t. 31.; Sm. Eng. Bot., t. 1937.; Rees's Cyclo., No. 37.; Engl. Fl., 4. p. 184.; Forbes in Sal. Wob., No. 29.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 246.
Synonymes. S. amerìna *Walker Essays on Nat. Hist.*; *S.* frágilis, part of, *Koch Comm.*, p. 15.
The Sexes. Both sexes are described in *Eng. Fl.*: the male is figured in *Eng. Bot.* and *Sal. Wob.* "I am only acquainted with the sterile plant." (*Hook. Br. Fl.*)
Engravings. Hoffm. Sal., 2. t. 31.; Eng. Bot., t. 1937.; Sal. Wob., No. 29.; our *fig.* 1309.; and *fig.* 29. p. 1609.

Spec. Char., &c. Leaves lanceolate, pointed, serrated, very smooth; floral ones partly obovate and recurved. Footstalks somewhat glandular. Ovary tapering, stalked, smooth. Style longer than the cloven stigmas. Branches smooth, highly polished. (*Sal. Wob.*, p. 57.) A native of Britain, growing plentifully in woods and hedges; and flowering in May. According to Pursh, it grows in North America, on road sides and about plantations; but was introduced from Europe. (*Fl. Amer. Sept.*) It forms an upright, but not lofty, tree, distinguished by the smooth clay-coloured bark of the last year's branches, which shine like porcelain, as if varnished; the shoots of the present year being stained of a fine red or crimson. This species is frequently cultivated for basketwork; and, when planted in moist ground, it produces annual shoots 6 ft. or 8 ft. in length, when cut down; but, in a few years, these gradually become shorter, and the plant ceases to be worth cultivating. The crimson colour of its twigs, in this state, readily distinguishes it from every other species; though it is often confounded with *S.* frágilis. A tree in the Horticultural Society's Garden was, in 1834, after being ten years planted, 14 ft. high.



1309

Statistics. In Oxfordshire, on the banks of the Cherwell, in Christ Church Meadow, a tree, estimated to be of 40 years' growth, is 40 ft. high; the diameter of the trunk 3 ft., and of the head 60 ft. There are plants in the Hackney and Goldworth arboretums, and at Henfield.

☨ 21. *S.* MONTA'NA *Forbes.* The Mountain Willow.

Identification. Forbes in Sal. Wob., No. 19.
The Sexes. The female is figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 19.; and our *fig.* 19. in p. 1606.

Spec. Char., &c. Leaves lanceolate, with long, narrow, tapering points; glaucous, and slightly hairy beneath; margins closely serrated. Branches yellow. Catkins accompanying the leaves. Ovary nearly sessile, ovate-lanceolate,

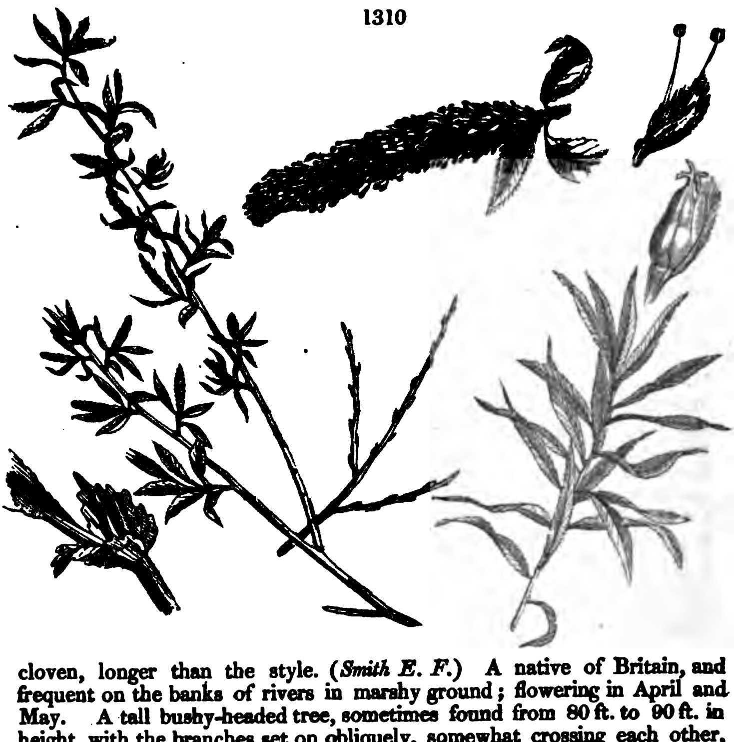
glabrous. Styles scarcely so long as the notched stigmas. (*Sal. Wob.*, p. 37.) A native of Switzerland, where it forms an upright-growing tree, much resembling *S.* vitellìna, both in twigs and foliage. Catkins accompanying the leaves, or appearing immediately after their expansion in May and June, and nearly 2 in. long. According to Mr. Forbes, this species deserves cultivation for the sake of its twigs and rods, which are little, if at all, inferior to those of *S.* vitellìna for tying, and for the finer sorts of wickerwork, baskets, &c. There are plants in the Goldworth Arboretum, and also at Woburn Abbey and Flitwick House.

¥ 22. *S.* FRA'GILIS *L.* The brittle-*twigged, or Crack*, Willow.

Identification Lin. Sp. Pl., 1443.; Willd. Sp. Pl., 4. p. 669.; Smith Eng. Bot., t. 1807.; Eng. Fl., 4. p. 1804; Forbes in Sal. Wob., No. 27.; Hook. Br. Fl., ed. 3., p. 421.; Mackay Fl. Hibern., pt. 1. p. 246.
Syncryme. *S.* frágilis, in part, *Koch Comm.*, p. 15.
The Sexes. Both sexes are figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Lin. Fl. Lapp., No. 349. t. 8. f. *b.*; Eng. Bot., t. 1807.; Sal. Wob., No. 27.; our *fig.* 1310.; *fig.* 27. in p. 1608.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves ovate-lanceolate, pointed, serrated throughout, very glabrous. Footstalks glandular. Ovary ovate, abrupt, nearly sessile, glabrous. Bracteas oblong, about equal to the stamens and pistils. Stigmas

1310



cloven, longer than the style. (*Smith E. F.*) A native of Britain, and frequent on the banks of rivers in marshy ground; flowering in April and May. A tall bushy-headed tree, sometimes found from 80 ft. to 90 ft. in height, with the branches set on obliquely, somewhat crossing each other, not continued in a straight line outwards from the trunk; by which character, Sir J. E. Smith observes, it may readily be distinguished even in winter. The branches are round, very smooth, "and so brittle at the base, in spring, that with the slightest blow they start from the trunk." Whence the name of crack willow; though, according to Sir J. E. Smith, this "is more or less the case with *S.* decípiens, and several other willows, both native and exotic." Many medical properties were formerly attributed to

this tree; but Sir J. E. Smith (in his *Eng. Fl.*, vol. iv. p. 186.) says that they belong, probably, to *S.* Russell*iàna*. The roots, however, of *S.* frágilis are used, in Sweden, to boil with eggs, to make them of a purple colour, at Easter; it being the custom there, as in many other countries, to make presents of coloured eggs at that festival. A similar custom is said to have prevailed anciently in Scotland. "The withy, or *S*àlix frágilis," says Gilpin, "is of little value in landscape; and yet there is something beautiful in its silver-coated catkins, which open, as the year advances, into elegant hanging tufts, and, when the tree is large and in full bloom, make a beautiful variety among the early productions of the spring." (*Gilp. For. Scen.*) For the properties and uses of this species as a timber tree, see p. 1460.

Statistics. In the environs of London, on the banks of the Thames, near Brentford, 50 ft. high. In Suffolk, at the bottom of the old Bury Botanic Garden, on the authority of Mr. Turner, the curator of the new Botanic Garden at Bury, there was "a noble tree, 90 ft. high; the diameter of the trunk 7½ ft., and of the head 54 ft. A portrait of this tree was lithographed by Mr. Strutt." This tree, which grew on the banks of the Lark, was blown down during the hurricane of November 29th, 1836. In Ireland, in the county Down, at Mount Stewart, 50 years planted, it is 57 ft. high; the diameter of the trunk 3½ ft., and of the head 27 ft. In Russia, at Petersburg, in the garden of the Taurida Palace, 49 ft. high; the circumference of the trunk 10½ ft., and of the head 49 ft. There are plants in the Hackney arboretum, and at Woburn Abbey, Flitwick House, Henfield, the Botanic Garden at Twickenham, and various other places.

♀ ■ 23. *S.* MONSPELIE'NSIS *Forbes.* The Montpelier Willow.

Identification. Forbes in Sal. Wob., No. 30.
Synonyme. ? *S.* frágilis var. (*Borrer* in a letter.)
The Sexes. The male is figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 30.; and *fig.* 30. in p. 1609.

Spec. Char., &c. Leaves elliptic-lanceolate, pointed, glabrous; green, shining above; pale, and somewhat glaucous beneath; margins strongly serrated, glandular. Stipules ovate-lanceolate, deeply serrated. Catkins about 2 in. long. Stamens 2. Bractea oblong, fringed. (*Sal. Wob.*, p. 59.) A native of Montpelier, in France. Introduced into England about 1825, or before, and flowering in the salictum at Woburn Abbey in April and May. It forms a small tree, 10 ft. or 12 ft. high, with round, smooth, tough branches, forming a bushy head; the young twigs pale yellow, but becoming of a brownish green colour at the base, like the preceding year's shoots. The leaves are from 4 in. to 6 in. long. There are plants in the Hackney arboretum, and at Woburn Abbey, Henfield, and Flitwick House.

♀ 24. *S.* RUSSELLIA'NA Smith. The Russell, *or Duke of Bedford's*, Willow.

Identification. Smith Fl. Br., p. 1045.; Willd. Sp. Pl., 4. p. 656.; Koch Comm., p. 15., at least in part; Smith Eng. Bot., t. 1801.; Eng. Fl., 4. p. 186.; Forbes in Sal. Wob., No. 28.; Hook. Br. Fl., ed. 3., p. 422.; Mackay Fl. Hibern., pt. 1. p. 246.
Synonymes. ? *S.* frágilis *Woodv.*, and other medical writers; the Dishley, or Leicestershire, Willow: in some counties, the Huntingdon Willow. Koch has deemed identical with this the following: — *S.* péndula *Ser. Sal. Helv.*, p. 79., from specimens from Seringe; *S.* víridis *Fries Nov.*, p. 120.; *S.* rùbens *Schrank Baier. Fl.*, 1. 226.
The Sexes. The female is figured in *Eng. Bot.* and *Sal. Wob.* Smith, in the *Eng. Fl.*, states that he had not seen the flowers of the male. Dr. Johnston, in his *Flora of Berwick upon Tweed*, states, that a male tree, which he has deemed of this species, is in "New-water-haugh Plantation."
Engravings. Eng. Bot., t. 1808.; Sal. Wob., No. 28., and the frontispiece; our *fig.* 1311.; and *fig.* 28. in p. 1608.

Spec. Char., &c. Leaves lanceolate, tapering at each end, serrated throughout, very glabrous. Footstalks glandular or leafy. Ovary tapering, stalked, longer than the bracteas. Style as long as the stigmas. (*Smith E. F.*) Smith states that he had not seen the flowers of the male of this kind; and this sex is not farther noticed in *Sal. Wob.* Dr. Johnston, in his *Flora of Berwick upon Tweed*, has noticed the existence of a male tree of what he deems this species within the province of his *Flora*; and has given the following botanical description of it: — "The male tree is very rare; and, if we are correct in our determination of it, the figure in Withering is not good. Its catkins are 2 in. long, cylindrical, and yellow. Stamens 2. Filaments not much longer than the pointed, more or less villous, bracteas. The catkins stand on short leafy branchlets; and the young leaves are entire, 1 in. to 2 in. long, but not otherwise different from the adult ones. Catkins

1311



of the female rather longer, lax, with smooth lanceolate ovaries." The following matter may be understood to relate chiefly, or wholly, to the female. A native of Britain, in marshy woods or osier grounds, and, in many places, flowering in April and May. This tree, like *S.* frágilis, is frequently found from 80 ft. to 90 ft. high. According to Mr. Forbes, it is more handsome than *S.* frágilis in its mode of growth, as well as altogether of a lighter or brighter hue. The branches are long, straight, and slender, not angular in their insertion, like those of *S.* frágilis; and the trees of both species, when stripped of their leaves, may be distinguished respectively by these marks. The leaves, Sir W. J. Hooker observes, are of a peculiarly handsome shape when in perfection; deeply sinuated, and much attenuated. This extremely valuable tree, the same high authority observes, was first brought into notice by His Grace Francis Duke of Bedford, about the beginning of the present century, and thence most appropriately honoured by bearing the family name. Of the size to which it reaches, some interesting details are given in the present Duke of Bedford's introduction to the *Salictum Woburnense*. The favourite tree of Dr. Johnson, at Lichfield, was of this species. It is commonly said that this tree was planted by Dr. Johnson; but, "in the *Gentleman's Magazine* for July, 1785 (seven months after Dr. Johnson's death), there is a particular account of this tree, wherein it is stated that it had been generally supposed to have been planted by Dr. Johnson's father, but that the doctor never would admit the fact. It appears, however, to have been

a favourite tree of the doctor's, and to have attracted his attention for many years: indeed, to use his own expression, it was the delight of his early and waning life; and it is said that he never failed to visit it whenever he went to Lichfield; and, during his visit to that city in the year 1781, he desired Dr. Trevor Jones, a physician of that place, to give him a description of it, saying it was by much the largest tree of the kind he had ever seen or heard of, and therefore wished to give an account of it in the *Philosophical Transactions*, that its size might be recorded. Dr. Jones, in compliance with his request, furnished him with the particular dimensions of the tree, which were as follows: — The trunk rose to the height of 12 ft. $8\frac{5}{10}$ in., and then divided into 15 large ascending branches, which, in very numerous and crowded subdivisions, spread at the top in a circular form, not unlike the appearance of a shady oak, inclining a little towards the east. The circumference of the trunk at the bottom was 15 ft. $9\frac{5}{10}$ in.; in the middle, 11 ft. 10 in.; and at the top, immediately below the branches, 13 ft. The entire height of the tree was 49 ft.; and the circumference of the branches, at their extremities, upwards of 200 ft., overshadowing a plane not far short of 4000 ft. The surface of the trunk was very uneven, and the bark much furrowed. The tree had then (Nov. 29. 1781) a vigorous and thriving appearance. The most moderate computation of its age was, at that time, near fourscore years; and some respectable authorities were strongly inclined to think that a century had passed over its head." The tree stood near the public footpath in the fields between the city of Lichfield and Stow Hill, the residence of the celebrated "Molly Ashton;" and it is said that Dr. Johnson frequently rested under its shade when on his way to the house of that lady, whom he never failed to visit periodically, till a short period before his death. (See *Croker's edition of Boswell's Johnson.*) There is a portrait of Johnson's Willow given as a frontispiece to the *Salictum Woburnense;* but, as that figure has much more the appearance of a spreading beech than of a willow of any kind, we were induced to doubt its fidelity. We accordingly made enquiries, through a friend at Lichfield, respecting the original tree; and we have satisfied ourselves that the portrait alluded to bears very little resemblance to what Johnson's Willow was at any stage of its growth; or, at least, at any time since the year 1810. (See *Gard. Mag.*, vol. xii. p. 716; and vol. xiii. p. 94.) There are two engravings of Johnson's Willow in the *Gentleman's Magazine* for 1785; one of these, a south-west view of the tree, taken in July, 1785, by Mr. Stringer, and which may be considered as representing the appearance of the tree at Dr. Johnson's death, is copied to the reduced scale of 1 in. to 12 ft. in *fig.* 1312. From this period, the tree appears to have gradually increased in size till April, 1810, when Dr. Withering found the trunk to girt 21 ft. at 6 ft. from the ground, and to extend 20 ft. in height, before dividing into enormous ramifications: the trunk and branches were then perfectly sound, and the very extensive head showed unimpaired vigour. In November of the same year, however, many of the branches were swept away in a violent storm; and nearly half of what remained of the tree fell to the ground in August, 1815, leaving little more than its stupendous trunk, and a few side boughs. We have seen a portrait of the tree by Mr. Stringer, made in 1816, which was kindly lent to us by that gentleman, by which it appears to have been then considerably mutilated, and in a state of decay. This decay was accelerated by a fire made in the hollow of the trunk by some boys, in 1825, and which would probably have consumed the tree, had not Mr. Stringer, whose garden nearly adjoins it, seen flames proceeding from the trunk, and sent some of his men for the town engine to extinguish the fire. In April, 1829, the tree was blown down in a violent storm, which took place on the 29th of that month, about 3 o'clock in the afternoon. A drawing was taken of the tree as it lay on the ground, from which a lithograph was published, representing its appearance before its fall; and from this lithograph *fig.* 1313. is reduced to the scale of 1 in. to 12 ft.



1312

After the tree was blown down, Mr. Holmes, a coachmaker residing in Lichfield, and the proprietor of the ground on which Johnson's Willow stood, regretting that there was no young tree to plant in its stead, recollected that, the year before, a large branch had been blown down, part of which had been used as pea-sticks in his garden; and examined these, to see if any of them had taken root. Finding that one had, he had it removed to the site of the old tree, and planted there in fresh soil; a band of music and a number of persons attending its removal, and a dinner being given afterwards by Mr. Holmes to his friends, and the admirers of Johnson. The young tree is, at present, in a flourishing state, and 20 ft. high. Johnson's Willow, at the time of its fall, was estimated to be of the age of 130 years, and its greatest height appears to have been about 60 ft. After it was blown down, some of Johnson's admirers, at Lichfield, had its remains converted into snuff-boxes and similar articles.

Great as is the affinity, botanically speaking, between *S.* Russell*iàna* and the preceding species, *S.* frágilis, its economical properties are wholly different. The timber of *S.* Russell*iàna* is considered as the most valuable of any of the willow tribe. So important is it as a plantation tree, that Mr. Lowe, in his *Survey of the County of Nottingham*, states that, at eight years' growth, the poles yielded a net profit of 214*l.* per acre; and, in two years more, they would probably have produced 300*l.* per acre. The late George Biggin, Esq., of Crossgrove Priory, an able chemist, ascertained that the



1313

bark of this tree contains the tanning principle in a superior degree to that of the oak; and it is supposed that the medical properties stated to belong to *S.* frágilis are attributed to it by mistake, and should be referred to *S.* Russelliàna. (*Hook. Brit. Flor.*, p. 415., with additions.) The bark, according to Sir J. E. Smith, has been found useful as a substitute for cinchona in agues. (*Eng. Fl.*, vol. iv. p. 187.) This species is as readily propagated by cuttings or truncheons as any other; and, though it thrives best in good soil near water, it attains a considerable size in uplands.

Varieties. Many forms intermediate between *S.* frágilis and *S.* Russelliàna are extant, which seem to me to be hybrids. (*Koch.*) It should be remembered that Koch has included in his idea of *S.* frágilis the *S.* decípiens of the English botanists, and, perhaps, other exotic forms as dissimilar as this is.

Statistics. In the environs of London, at Syon, there is a tree of *S.* Russelliàna 89 ft. high; the diameter of the trunk 4 ft. 4 in., and of the head 65 ft.: at Ham House, there is a tree 63 ft. high; the diameter of the trunk 32 ft., and of the head 59 ft. In Staffordshire, by the side of the road leading from Lichfield to Stow, on the spot on which Johnson's Willow stood, a cutting of the old tree was planted in 1830, which, in May, 1836, was 20 ft. high, and in a most vigorous state of growth. In Scotland, in Stirlingshire, at Callender Park, 60 ft. high; the diameter of the trunk 3 ft. 8 in., and that of the head 70 ft.: a tree, at Gordon Castle, at the age of 61 years, was 57 ft. high, and above 11 ft. in its greatest circumference. This tree, it is stated in the *Salictum Woburnense*, was blown down in a storm, on the 24th of November, 1826. In Ireland, at Terenure, near Dublin, 15 years planted, it is 25 ft. high; in the Cullenswood Nursery, there is a tree, which is said to be this species, 90 ft. high, which, according to the Return Paper sent us, has not yet been 30 years planted.

‡ 25. *S.* Pursh*ia'na* Borrer. Pursh's Willow.

Identification. Mr. Borrer suggests that this species may be called *S.* Purshiàna, as there is an older *S.* ambígua. (*Borrer* in a letter.)
Synonyme. *S.* ambígua *Pursh Fl. Amer. Sept.*, 2. p. 617., *Smith* in *Rees's Cyclo.*, 26., *Forbes* in *Sal. Wob.*, No. 154., *Hook. Br. Fl.*, ed. 2., incidentally under *S.* ambígua *Ehrh.*
The Sexes. The male is described in *Sal. Wob.*

Spec. Char., *&c.* Leaves lanceolate, pointed, serrated, glabrous; shining above, glaucous underneath. Footstalks stout, glandular at the summit. Stipules half-heart-shaped, serrated, deciduous. Catkins accompanying the leaves. Stamens 2. Bracteas rounded and concave. (*Sal. Wob.*, p. 282.) A native of North America, in low grounds; and flowering in March and April. This appears to be a rapid-growing tree, with round, greenish-brown, smooth branches. The leaves are from 5 in. to 6 in. long, and about 1½ in. in breadth, somewhat resembling those of *S.* Russelliàna, but much broader, and more obtuse at the base; wherein they resemble those of *S.* frágilis; they, however, differ from this species by their very white glaucous hue underneath; the serratures are, likewise, much coarser, and they are glandular, which is very obvious in the young leaves, that are generally furnished with two obtuse glands at the insertion of the footstalks, which sometimes run into small leaflets. Footstalks stout, glabrous. Catkins appearing with the leaves. Stamens 2 in a flower. There are plants under the name of *S.* ambígua in the Hackney and Goldworth arboretums; also at Woburn Abbey, and Henfield.

App. i. *Frágiles introduced, but not yet described, or of doubtful Identity.*

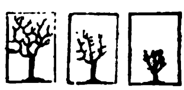
S. adscéndens in Donald's Nursery. This kind is extremely dissimilar to the *S.* adscéndens of *Eng. Bot.* and *Sal. Wob.* *S. bigémmis* Lodd. Cat., ed. 1836. Specimens were received from the Hackney and Goldworth arboretums, which appear quite different from the *S.* bigémmis of Hoffmann, which is identified with *S.* daphnöides *Villars.* *S. decípiens*, fem., *Lodd. Cat.*, ed. 1836. *S. frágilis* and *S. murìna* Lodd. Cat., ed. 1836. *S. rùbra* G. Lodd.

App. ii. *Frágiles described, but not yet introduced, or of doubtful Identity with introduced Species.*

S. frágilis, mas et fem., Host Sal. Aust., 1. p. 5. t. 18, 19., Fl. Aust., 2. p. 635. *S. fragílior*, mas et fem., Host Sal. Aust., 1. p. 6. t. 20, 21., Fl. Aust., 2. p. 636. *S. fragilíssima*, mas et fem., Host Sal. Aust., 1. p. 6. t. 22, 23., Fl. Aust., 2. p. 636.; synon. *S.* frágilis *Host Syn.*, p. 527. *S. palústris*, mas et fem., Host Sal. Aust., 1. p. 7. t. 24, 25.; Fl. Aust., 2. p. 637. *S. capénsis* Thunb. Fl. Cap., 1. p. 139., *Smith* in *Rees's Cyclo.*, under No. 42., resembles *S.* babylónica, and is probably a variety of that species. *S. subserràta* Willd. Sp. Pl., 4. p. 671., *Smith* in *Rees's Cyclo.*, No. 45. (*S. Sáfsaf be'lledi* Forsk. Cat. Pl. Ægypt., 76.), is described as having a leaf very like that of *S.* babylónica. (*Rees's Cyclo.*)

Group vi. *A'lbæ* Borrer.

Trees of the largest Size, with the general Aspect of the Foliage whitish.

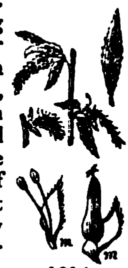


Stamens 2 to a flower. Ovary glabrous. Flowers loosely disposed in the catkin. Leaves lanceolate, serrated with glanded serratures; hairy, especially while young, with appressed silky hairs, which give to the foliage a light or whitish hue. Plants trees of considerable height. (*Hook. Br. Fl.*, ed. 2., adapted.)

‡ 26. *S.* a'lba *L.* The *whitish-leaved, or common* white, *Willow.*

Identification. Lin. Sp. Pl., 1449.; Willd. Sp. Pl., 4. p. 710.; Sm. Eng. Bot., t. 2430.; Eng. Fl., 4. p. 231.; Forbes in Sal. Wob., No. 136.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 247.; Hayne Abbild., p. 254.; Host Sal. Aust., 1. p. 9.; Pursh Fl. Amer. Sept., 2. p. 616.
Synonymes. Sàlix *Raii Syn.*, 447., *Ger. Emac.*, 1389. with a fig.; *S.* álba, part of, *Koch Comm.*, p. 16.; the Huntingdon, or Swallow-tailed Willow. (*Pontey's Prof. Planter*, ed. 1816, p. 92.)
The Sexes. Neither is rare in England. Both are described in *Eng. Fl.*, and both figured in *Eng. Bot.*, *Sal. Wob.*, *Host Sal. Aust.*, and *Hayne Abbild.*
Engravings. Eng. Bot., t. 2430.; Sal. Wob., No. 136.; Host Sal. Aust., 1. t. 32, 33.; Hayne Abbild., t. 197.; our *figs.* 1314. and 1315.; *fig.* 136. in p. 1629.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves elliptic-lanceolate, pointed, serrated, silky on both sides; the lowest serratures glandular. Stamens hairy. Germen smooth, almost sessile. Stigmas deeply cloven. Scales notched. (*Sal. Wob.*, p. 271.) A native of Europe, from Norway and Sweden to the Mediterranean Sea; of the north-east and west of Asia; and introduced into the United States; near all the larger rivers of Russia and Livonia, especially the Irtish, where it attains the height of a large tree. It is frequent in Britain, and also in Ireland; and has long been more extensively planted as a timber tree than any other species. It grows rapidly, attaining the height of 30 ft. in ten or twelve years, and growing 50 ft. or 60 ft. high, or upwards, even on inferior soils. In favourable situations, it will reach the height of 80 ft. or upwards. It is very extensively planted as a pollard tree, not only in Britain, but in many parts of the Continent, and even in Russia; some hundreds of miles of the road from Moscow to the Austrian frontier, where it crosses those interminable steppes that appear bounded only by the horizon, being marked by pollards of *S.* álba, at regular distances along each side of the road.



1314

Varieties. Mr. Borrer suggests that, perhaps, two species are included in *S.* álba. (*Borr.* in a letter.) " One of the few botanists really acquainted with willows, Mr. Borrer, has suggested that there are some presumptive distinctions between our *S.* álba and that of Hoffmann, in the shape of the lower leaves, and of the bracteas (scales), as well as in the length and density of the catkins." (*Smith* in *Eng. Fl.*, iv. p. 232.)

¶ S. *a.* 2 *cærùlea; S.* álba var. *Smith Fl. Brit.*, p. 1072.; *S.* cærùlea *Smith Eng. Bot.*, t. 2431., *Forbes* in *Sal. Wob.*, No. 137., *Smith* in *Rees's Cyclo.*, No. 141.; *S.* álba β *Smith Eng. Fl.*, iv. p. 231., *Koch Comm.*, p. 16. The upland, or red-tinged, Willow, *Pontey Profit. Planter*, 4th ed., 1814, p. 72.; the Leicester Willow, *Davy's Agricultural Chemistry*, 1st ed.; *Blue Willow*, Smith, and our *fig.* 137. in p. 1629. — This kind has been treated of by Smith as a variety of *S.* álba in his *Fl. Brit.*, as a species in *Eng. Bot.*, and subsequently, in his *Eng. Fl.*, as a variety of *S.* álba. Forbes, in *Sal. Wob.*, has treated of it as a species, and given the following distinctive character of it, which is the same as that given in *Eng. Bot.* Leaves lanceolate, taper-pointed, serrated; the under side at length almost naked of hairs; the lowest serratures glandular. Stigmas deeply cloven. (*Sal. Wob.*, p. 273.) The female is figured in *Eng. Bot.*, where the male is stated to be not discovered; but the figure in *Sal. Wob.*, given as of this kind, exhibits the latter sex, which is common, Mr. Borrer informs us, about Chichester, Bognor, &c., almost to the exclusion of the female; whilst he has never seen a male *S.* álba in flower in Sussex, eastward of the neighbourhood of Arundel, with the exception of some which he had himself introduced. *S. a.* cærùlea is a native of Britain, in meadows and moist woods; flowering, in the Woburn collection, in May, and again in August. This willow, Sir J. E. Smith observes, which is " mentioned in the *Flora Britannica* as a variety of *S.* álba, is so remarkable and so valuable, that we venture to name it as a species, that it may be the more noticed. The male flowers, when known, may, perhaps, afford better characters than we have been able to obtain from the leaves. The late Mr. Crowe, who found the female plant wild in Suffolk, was of opinion that this might be taken for *S.* álba in many parts of England, the real one (*E. B.*, t. 2430. [our *fig.* 1315.]) not being known in some of the northern counties. He had for many years paid great attention to this tree, as have Mr. Rigby at Framlingham, and Mr. Browne at Hetherset, Norfolk. A cutting, planted by the latter, became, in 10 years, a tree 35 ft. high, and 5 ft. 2 in. in girt, and was blown down in 1800. This is a rapidity of growth beyond



1315

all comparison with that of the common white willow, and even exceeding that of *S.* Russelli*àna* (No. 24. in p. 1517.). The wood and bark are at least equal in quality to those of *S.* álba. The foliage is distinguished by its great luxuriance, more azure hue, and the almost entire want of the hairs from the under side of the adult leaves. Mr. Crowe thought the stipules might afford distinctions, but we find them too variable." (*Sm.* in *Rees's Cyclo.*, vol. xxxi. No. 140.) Mr. Forbes says: "Although this plant has been reunited with *S.* álba, it appears to me to be sufficiently distinct, and to be recommended for the quickness of its growth; the leaves are, also, much larger than the last when cut down, and, as well as the twigs, are of a darker hue." In the parish of Waterbeach, Cambridgeshire, there are numerous trees of *S.* álba, the vigorous shoots and branches of which, and especially those of pollard trees, have red bark, which, when the trees are leafless in winter, are very conspicuous. This

appears to be the upland, or red-twigged, willow of Pontey; but it may possibly be only a variation of the species, or the female. The uses and culture of this sort may, of course, be considered as the same as the last. There is a plant of this variety in Essex, at Audley End, which, 20 years planted, is 55 ft. high; the diameter of the trunk 2½ ft., and of the head 45 ft. In Northamptonshire, at Wakefield Lodge, a tree, 16 years planted, is 30 ft. high. There are plants in the Hackney arboretum, and at Woburn and Flitwick.

♈ *S. ? a.* ? 3 *críspa.*—A specimen received from Mr. Donald, nurseryman, Woking, Surrey, named *S.* críspa, is very different from *S.* críspa *Forbes* in *Sal. Wob.*, and seems clearly *S.* álba. The specimen consists of a young shoot of the year, bearing leaves; and these leaves are narrow, contorted, and silky. So far as we can judge from the single specimen, the kind may be regarded as a variety of *S.* álba, analogous to that which *S.* b. críspa, *S.* annulàris *Forbes*, is, relatively to *S.* babylónica.

♈ *S. a.* 4 *ròsea* Lodd. Cat., ed. 1836.—The plant in Messrs. Loddiges's collection under this name does not show any obvious marks of difference from *S.* álba, nor any striking appearance of rosiness. The epithet *ròsea*, may probably have been applied in relation to the rosaceous tufts of leaves which are sometimes found on *S.* álba, as noticed under *S. Hèlix*.

Properties and Uses. In the north of Europe, the bark of this tree is used for tanning leather, and for dyeing yarn of a cinnamon colour; and the leaves and young shoots are given to cattle in a green state, or dried like the twigs of the birch, and laid up for winter fodder. The inner bark of this tree, like that of Scotch pine, being kiln-dried, and ground into a fine flour, is mixed with oatmeal, and made into bread, in seasons of great scarcity, by the inhabitants of Norway and Kamtschatka. The branches of the tree are used as stakes, poles, handles to rakes, hoes, and other implements, and as faggot-wood for fuel. The timber of the trunk is used for various purposes. It weighs, in a green state, 70 lb. 9 oz. per cubic foot; half-dry, 51 lb. 14 oz.; and quite dry, 32 lb. 12 oz.; so as to lose more than one half of its weight by drying, during which it loses a sixteenth part of its bulk. In ship bottoms, Mr. Gorrie informs us, it is not found so liable to split by any accidental shock as oak, or other hard wood. It is found an excellent lining for stone-carts, barrows, &c. In the roofs of houses, rafters of this tree have been known to stand a hundred years; and, with the exception of about half an inch on the outside, the wood has been found so fresh at the end of that period, as to be fit for boat-building. (*Gard. Mag.*, vol. i. p. 45.) The wood is also used in turnery, mill-work, coopery, weather-boarding, &c.; and the stronger shoots and poles serve for making hoops, handles to hay-rakes, clothes-props (see fig. 169. *Encyc. of Cott. Arch.*), and various other instruments and implements; and the twigs are employed in wickerwork. Mitchell says the Huntingdon willow has been in great demand for making willow hats for gentlemen's summer wear, split, and worked the same as straw for bonnets. (*Dend.*, p. 56.) The bark, which is thick, and full of cracks, is in nearly as great repute for tanning as that of the oak; and it is also used in medicine, in the cure of agues, as a substitute for cinchona; though it is inferior for both purposes to that of *S.* Russelliàna. As fuel, the wood of this tree is to that of the beech as 808 is to 1540; but the old bark makes a very useful fuel; and both it and the wood will burn when green, in which state the wood is said to give out most heat. The charcoal is excellent for use in the manufacture of gunpowder, and for crayons. The ashes are very rich in alkali, containing more than a tenth part of their weight of that salt. In France, a fine blood-red colour is obtained from the bark; and that of the young tree is used in the preparation of leather for making gloves.

Propagation and Culture. It is justly remarked by Mr. Gorrie, that it adds much to the value of the *Sàlix álba*, that its propagation and culture are of the most simple description; and that it will grow luxuriantly in most soils where other trees make but slow progress. According to Sang, it will thrive well in high and dry grounds; and, if planted in the grove manner, perhaps no other plantation, except larches, would give so quick a return for the trouble and expense of planting. "It is an excellent coppice-wood, grows extremely fast, and is very valuable. It is likewise an excellent nurse to other plants placed in humid situations, as in such it outgrows all other trees." (*Plant. Kal.*, p. 103.) A plantation made by Mr. Gorrie on the northern bank of the Carse of Gowrie, in Perthshire, is thus described by him in December, 1825, fourteen years after it was planted:—"The soil is a dry ground, which effervesces freely with acids, and is, consequently, calcareous. Its surface is very steep, forming a slope of 43°; and so poor, that it was without any sward or covering of grass. At the bottom ran a small rivulet, on a bed of the same kind of gravel. The banks and higher grounds were planted with oaks, larches, and Scotch pines; and the sides of the rill with alders and Huntingdon willows. The undertaking was by my neighbours reckoned foolish, and I had to encounter no little obloquy for my presumption. The result, however, has been favourable; the plants on the high ground come away boldly, and in the hollow, which is only about 50 ft. above the level of the sea, the Huntingdon willow has made astonishing progress: at 4 ft. above the ground, several of the trees already measure 46 in. in circumference, and in height from 55 ft. to 60 ft.; giving fully 1 in. in diameter, and 4 ft. in altitude, for every year they have been in the soil. The plants were about 4 ft. in height, and ½ in. in diameter, at planting. Pruning has been regularly attended to; all large aspiring branches having been removed, and the leading shoot and numerous small side shoots encouraged, for the purpose of producing sufficient foliage to elaborate the sap. One peculiar advantage in the culture of this valuable tree is, that, in planting it, rooted plants are not absolutely requisite. I have found shoots of from 6 ft. to 8 ft. long, and about 2 in. in diameter, succeed better than rooted plants: they require to be put in from 18 in. to 2 ft. deep in marshy soil, which should be drained: the numerous roots sent out in such soil afford abundant nourishment, and shoots are produced the first year more vigorous than when the plants have been previously rooted." (*Gard. Mag.*, vol. i. p. 46.) On writing to Mr. Gorrie for an account of the present state of this plantation, 10 years having elapsed since the above was written, he informs us that, in October, 1836, he took a carpenter, and measured several of the same trees, of which the dimensions were taken in December, 1825, and found that they had increased very considerably in growth. "One tree now (in 1836) measures in circumference, at 1 ft. from the ground, 71½ in., two trees 68 in., and one tree 67 in. The average girt of those which grow near the rivulet is from 62 in. to 68 in.; but those which stand further from the stream are smaller. The measurable solid wood, above 6 in. in diameter, is 30 solid feet on each of two of the largest trees; and 25 solid feet on each of two other trees. Two trees have lately been blown over by the wind, which stood beyond the reach of the stream; and these measured, the one 76 ft., and the other 80 ft., in length. On cutting up the wood of these trees into boards, it showed a beautifully waved bird's-eye appearance, and it readily acquired a smooth glossy surface. These trees have now been planted 24 years; and the largest one, which is that first mentioned above, as girting 71½ in., measures, within a fraction, 1 in. in diameter for every year it has stood; and the accumulation of solid wood is yearly increasing in proportion to the extent of the circumference. The solid measurable wood in the largest tree averages at the rate of 1 ft. 3 in. for every year it has been planted. Upon the whole," concludes Mr. Gorrie, than who no man is a more competent judge on this subject, "I continue of opinion that few trees can come in competition with the *Sàlix álba*, for rapidity of growth, elegance of form, and, in short, value." At Woburn Abbey, there are five trees of this

species, which stand on the margin of a pond, and were planted as cuttings there in 1808, and measured for us in 1836. The height of these trees was respectively 60 ft., 63 ft., 60 ft., 70 ft., and 71 ft.; and they contained in the trunk 17 ft., 20 ft., 16 ft., 42 ft., and 22 ft., and, with the addition of the branches and bark, 55 ft., 85 ft., 40 ft., 101 ft., and 60 ft. It thus appears that the largest tree had increased in its trunk at the average yearly rate of exactly 1½ cubic foot, and, in the trunk and head taken together, at the rate of more that 3½ cubic feet; which increase accords in a very satisfactory manner with that above recorded by Mr. Gorrie.

Pontey calculates that an acre of land worth 3*l*. 10*s*. annually for rent and taxes, if planted with the Huntingdon willow in sets cut from shoots of two years' growth, and 10 in. or 12 in. in length, would, in 7 years, be worth 67*l*. 10*s*. per acre; thus affording a clear profit of 39*l*. a year. (*Prof. Plant*, 4th ed., p. 72.)

Sir J. E. Smith, in speaking of this willow, says that the bark is thick, full of cracks, good for tanning, and for the cure of agues, though inferior in quality to that of *S.* Russelliàna, "the true Bedford, or Huntingdon, willow." We are certain that in Scotland, and, we think, frequently in England, the term "Huntingdon willow" is applied to *S.* álba.

Sàlix álba is one of the few willows which Gilpin thinks "beautiful, and fit to appear in the decoration of any rural scene. It has a small narrow leaf, with a pleasant light sea-green tint, which mixes agreeably with foliage of a deeper hue." In ornamental plantations, care should be taken never to plant this species of willow with trees which are not of equally rapid growth with itself; for, with the exception of poplars, no tree so soon destroys the character of young plantations of hard-wooded trees, such as pines, oaks, beeches, &c. Perhaps one of the best situations, in point of ornament, is on the banks of a broad river or lake, ample room being allowed for the head to expand on every side; but, when the object is to produce clean straight timber, the tree requires to be drawn up in masses. It is observed by Sang, that, if "the Huntingdon willow were not so very common, and so frequently met with in low or mean scenery, it might, perhaps, be reckoned more ornamental than many of the other kinds. They certainly are very elegant plants when young, and in middle age; and, if not picturesque when grown old, yet there is something very striking in their hoary and reverend appearance." (*Plant. Kal.*)

Statistics.—Recorded Trees. Mitchell speaks of a Huntingdon willow, near the Lodge of Milton House, Northamptonshire, 70 ft. high, with a head 60 ft. in diameter, and the stem 13 ft. in circumference. There is a holt of this willow, he says, in Cheshire, between the river Weaver and the Manchester canal, the trees in which are 70 ft. high. In Farey's *Derbyshire Report*, it it stated, that a tree of Sàlix álba, felled at Wilksworth, produced 156 ft. of timber, which sold at 2*s*. 6*d*. per foot.

Sàlix álba in England. Near London, at Ham House, Essex, it is 79 ft. high, with a trunk 2 ft. 3 in. in diameter; on the Common of Turnham Green, the tree of which a portrait is given our last Volume was 65 ft. high, but it was blown down in the hurricane of the 29th of November, 1836. In Devonshire, at Killerton, it is 65 ft. high, with a trunk 2 ft. 10 in. in diameter. In Gloucestershire, at Doddington, 46 years planted, it is 60 ft. high; the diameter of the trunk 2½ ft., and of the head 50 ft. In Cheshire, at Eaton Hall, 17 years planted, it is 50 ft. high. In Denbighshire, at Llanbede Hall, 45 years planted, it is 57 ft. high. In Oxfordshire, near Oxford, on the banks of the Cherwell, it is 60 ft. high; the diameter of the trunk 4 ft., and of the head 60 ft. In Pembrokeshire, at Stackpole Court, 50 years planted, it is 60 ft. high. In Rutlandshire, at Belvoir Castle, 26 years planted, it is 50 ft. high. In Suffolk, at Bury St. Edmunds, near the site of the ancient church, a tree of this species, in 1835, was 75 ft. high; the circumference of the trunk 18 ft. 6 in., and that of the two principal limbs 15 ft. and 12 ft. respectively; the circumference of the space covered by the branches was 204 ft., and the cubic contents of the tree were 440 ft. of solid timber. The above dimensions were taken from Mr. Strutt's *Sylva*, who has given an engraving of the tree, from which *fig.* 1316. is reduced to the scale of 1 in. to 50 ft.



1316

This tree began to decay in 1835; and in November, 1836, as we are informed by Mr. Turner, three fourths of it were dead; so that it now presents a splendid ruin. In Yorkshire, at Hornby Castle, it is 70 ft. high, the diameter of the trunk 4½ ft., and of the head 80 ft.

Sàlix álba in Scotland. Near Edinburgh, at Hopetoun House, it is 70 ft. high; diameter of trunk 4 ft. 9 in.; and of the head 65 ft. In Haddingtonshire, at Tyningham, it is 36 ft. high; the diameter

of the trunk 2 ft., and of the head 99 ft. In Lanarkshire, in the Glasgow Botanic Garden, 16 years planted, it is 55 ft. high. In Banffshire, at Gordon Castle, it is 56 ft. high. In Perthshire, in the Perth Nursery, 8 years planted, it is 22 ft. high.

Sàlix álba in Ireland. In Kilkenny, at Woodstock, 65 years planted, it is 70 ft. high; the diameter of the trunk 3½ ft., and of the head 65 ft. In Sligo, at Makree Castle, it is 65 ft. high; the diameter of the trunk 5 ft. and of the head 60 ft.

Sàlix álba in Foreign Countries. In France, at Nantes, in the nursery of M. De Nerrières, 30 years planted, it is 38 ft. high. In Bavaria, at Munich, in the Botanic Garden, 84 years planted, it is 50 ft. high.

¥ 27. *S.* VITELLI'NA *L.* The yolk-of-egg-coloured, *or yellow*, Willow, *or Golden Osier.*

Identification. Lin. Sp. Pl., 1442.; Willd. Sp. Pl., 4. p. 668.; Host Sal. Aust., 1. p. 9. t. 30, 31.; Hoff. Sal., 1. p. 57. t. 11, 12. and 24. f. 1. (*Smith*); Smith Eng. Bot., t. 1389.; Eng. Fl., 4. p. 182.; Forbes in Sal. Wob., No. 20.; Hook. Br. Fl., ed. 3., p. 423.; Mackay Fl. Hibern., pt. 1. p. 248.
Synonyme. S. álba *Koch Comm.*, p. 16.
The Sexes. Both sexes are figured in *Eng. Bot.*, *Sal. Wob.*, and *Host Sal. Aust.*
Engravings. Hoffm. Sal., t. 11, 12. and 24. f. 1.; Host Sal. Aust., t. 30, 31.; Eng. Bot., t. 1389.; Sal. Wob., No. 20.; *fig.* 20. in p. 1606.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves lanceolate, acute, with cartilaginous serratures; glabrous above; glaucous, and somewhat silky beneath. Stipules minute, lanceolate, deciduous, smooth. Ovary sessile, ovate-lanceolate, smooth. Bracteas linear-lanceolate, acute, fringed at the base, longer than the pistil. (*Smith Eng. Fl.*, iv. p. 182.) *S.* vitellìna, strangely referred to *S.* álba as a variety by the great Haller, differs from *S.* álba obviously in its longer, more taper catkins; lanceolate, pointed bracteas; glabrous filaments; and glabrous adult leaves, and, perhaps, in other marks. (*Smith*, incidentally in *Eng. Fl.*, under *S.* álba.) "Hoffmann observes that the inner layer of the bark in *S.* vitellìna is yellow, while that of *S.* álba is green; but I have great doubts of the constancy of this character." (*Smith*, under *S.* vitellìna.) A native of Britain, in hedges; and cultivated in osier grounds, in many places; and readily distinguished from all the other sorts, by the bright yellow colour of its branches. It has been introduced from Europe into North America, where, according to Mr. Pursh, it is common by road sides and in plantations." (*Smith* in his *Eng. Fl.*) It is much cultivated for basket-work, tying, &c., and also as an ornamental shrub or tree. The rods, being tough and flexible, Sir J. E. Smith says, are "fit for many purposes of basketwork, as well as for package." As an ornamental tree, Sàlix vitellìna is very striking in the winter season, especially among evergreens. As a shrub, it is not less so, both among evergreen shrubs and deciduous kinds, having the bark of conspicuous colours. In the English garden at Munich, extensive masses of this willow are placed in contrast with masses of the white-barked honeysuckle (Lonícera Xylósteum), the red-barked dogwood (Córnus álba), and the brown-barked spiræa (*S.* opulifòlia). The outlines of the masses at Munich are lumpish and formal, and the one mass is by no means blended with the other as it ought to be; but still the effect, in the winter season, is very striking, and well deserves imitation by the landscape-gardeners of this country. The tree of this species in the Horticultural Society's Garden, which is a male, and a very handsome tree, was 30 ft. high in 1835, after having been only ten or twelve years planted. Both male and female plants are in the Hackney arboretum and at Woburn Abbey.

Variety. Smith, in his *Eng. Fl.*, under *S.* rùbra, and Koch in his *Comm.*, p. 16., have cited a variety or variation of *S.* vitellìna, with reddish branchlets.

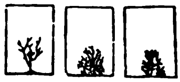
Statistics. In Hertfordshire, at Cheshunt, in the arboretum of William Harrison, Esq., on the banks of a stream, 7 years planted, it is 33 ft. high. In Ireland, in Galway, at Coole, it is 54 ft. high; the diameter of the trunk 2 ft., and of the head 57 ft. In Bavaria, in the Munich Botanic Garden, 84 years planted, it is 50 ft. high. In Austria, at Vienna, in the University Botanic Garden, 30 years planted, it is 40 ft. high; the diameter of the trunk 1 ft. 6 in., and of the head 28 ft: at Brück on the Leytha, 30 years planted, it is 30 ft. high.

App. i. *A'lbæ described, but which, probably, have not been introduced into Britain.*

S. *excélsior* Host Sal. Aust., t. 28, 29.

Group vii. *Nìgræ.*

Extra-European Kinds allied to the Kinds of one or all of the three preceding Groups.



Of the willows of Europe Koch has (*Comm.*) associated the kinds of Mr Borrer's groups Pentándræ, Frágiles, and A'lbæ into one group, which he has named Frágiles; and he has pointed out and described, as extra-European kinds belonging to it, *S.* occidentàlis *Bosc*, *S.* nìgra *Mühl.*, *S.* babylónica *L.*, *S.* octándra *Sieber*, and *S.* Humboldtiàna Willd. Mr. Borrer has included *S.* babylónica *L.* in his group Frágiles. The rest are here collected in a group by themselves, to which is added *S. l*igústrina *Michx. jun.*, from the notice by Mr. Forbes, and also by Michaux, that it is similar to *S.* nìgra.

♆ 28. *S.* NI'GRA *Mühlenb.* The black, *or dark-branched American*, Willow.

Identification. Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 237. t. 4. f. 5.; Sims and König's Ann. of Bot., 2. 65.; Willd. Sp. Pl., 4. p. 657.; Michx. N. Amer. Syl., 3. p. 78.; Pursh Fl. Amer. Sept., 2. p. 614.; Smith in Rees's Cyclo., No. 11.; Forbes in Sal. Wob., No. 152.; Koch Comm., p. 17., note.

Synonymes. S. caroliniàna *Michx. Fl. Bor. Amer.*, 2. p. 226.; *S.* pentándra *Walt. Fl. Car.*, 243.; *S.* vulgàris *Clayt. Fl. Virg.*

The Sexes. Both sexes are noticed in the specific character. Willdenow had seen the male alive, and both sexes in a dried state.

Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 4. f. 5.; Ann. of Bot., 2. t. 5. f. 5.; Michx. N. Amer. Syl., 3. t. 125. f. 1., without flowers; Sal. Wob., No. 152., the leaf; and *fig.* 152. in p. 1630.

Spec. Char., &c. Leaves ovate-lanceolate, pointed, serrated, green on both sides, glabrous, except a downy rib and footstalk. Catkins accompanying the leaves, villous. Stamens about 5, bearded at the base. Ovary stalked, ovate-lanceolate, glabrous. Stigmas divided, the length of the style. (*Sal. Wob.*, p. 280.) Catkin upon a seeming penduncle, which is a leafy twiglet. Stalk of the capsules 3—4 times as long as the gland. Stigmas ovate, emarginate. (*Koch Comm.*, p. 17., note *) Branches of a dark purple colour. Disk of leaf 2 in. or more long. (*Willd.*) A tree, 20 ft. high, with smooth branches, brittle at the base; a native of North America, from Pennsylvania to Virginia, on the banks of rivers. Introduced in 1811, and flowering in May. Mr. Forbes observes that *S. l*igústrina of Michaux differs principally from *S.* nìgra in its larger stipules, which resemble, as well as the leaves, those of *S.* triándra. (*Sal. Wob.*, p. 28.) There are plants in the Hackney and Goldworth arboretums, and at Woburn Abbey.

■ 29. *S.* HUMBOLDTIA'NA *Willd.* Humboldt's Willow.

Identification. Willd. Sp. Pl., 4. p. 657.; Smith in Rees's Cyclo., No. 8.; Humb. et Bonp. Nov. Gen. et Sp. Pl., 2. p. 176.; Forbes in Sal. Wob., No. 8.; Koch Comm., p. 18., note; Lodd. Cat., ed. 1836.

The Sexes. Both sexes are figured in *Sal. Wob.*, copied from *Humb. et Bonp. Nov. Gen. et Sp. Pl.* Koch has noticed (*Comm.*, p. 18., note) that in specimens which he had seen there were androgynous catkins mixed with catkins of female flowers.

Engravings. Humb. et Bonp. Nov. Gen. et Sp. Pl., t. 99. and 100.; Sal. Wob., No. 8.; and *fig.* 8. in p. 1604.

Spec. Char., &c. Leaves, linear, acuminated, finely serrated, smooth. Catkins appearing late, after the expansion of the leaves. Flowers polyandrous. Ovary stalked and glabrous. (*Willd. Sp. Pl.*, iv. p. 657.) Branches brown, shining, erect, flexible. (*Sal. Wob.*, p. 115.) A native of Peru, and cultivated in various places in South America. It was introduced in 1823; but, being somewhat tender, it had not, in 1829 (the date of the *Salictum Woburnense*), produced its flowers in England. Mr. Forbes finds, at Woburn, that it requires the protection of a green-house; but, in the Horticultural Society's Garden, it stood out against a wall for 6 years; and, though it was killed in the spring of 1836, Mr. Gordon is of opinion that it was not altogether owing to its tenderness. There are plants in the collection of Messrs. Loddiges.

■ ? ♆ 30. *S.* BONPLANDIA'NA Humb. et Bonpl. Bonpland's Willow.

Identification. Humb. et Bonpl. Nov. Gen. et Sp. Pl., 2. p. 20.; Forbes in Sal. Wob., No. 9.

The Sexes. Both sexes are figured in *Sal. Wob.*, copied from *Humb. et Bonp. Nov. Gen. et Sp. Pl.* A plant in the Woburn collection had not flowered in 1829.

Engravings. Humb. et Bonpl. Nov. Gen. et Sp. Pl., t. 101, 102.; Sal. Wob., t. 9.; and *fig.* 9. in p. 1604.

Spec. Char., &c. Leaves linear-lanceolate, narrow at the point, denticulate, glabrous, glaucous beneath. Catkins appearing after the expansion of the foliage. Stamens from 6 to 8. Ovary stalked, smooth. (*Sal. Wob.*, p. 17.) Stem erect, with round, smooth, even branches. A native of Mexico, introduced previously to 1829 into the Woburn salictum, where it has not yet flowered.

App. i. *Nìgræ described, but not yet introduced.*

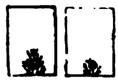
S. *ligústrina* Michx. N. Amer. Sylva, 3. p. 80. t. 125. f. 2.; Sal. Wob., p. 288. A tree, a native of North America, about 25 ft. high, which at first sight resembles *S.* nigra; but its leaves are longer, narrower, and have heart-shaped stipules at their base.

S. *occidentàlis* Bosc, on the authority of Koch (*Comm.*, p. 16.), is a native of the Island of Cuba.

S. *octándra* Sieb., on the authority of Koch (*Comm.*, p. 17.). Stamens 6—10. Stipules obliquely ovate, acute. Wild in Egypt. Sieber deems it akin to *S.* tetraspérma *Roxb.*; but Koch, who had seen a dried specimen, thinks them different.

Group viii. *Prinöìdes* Borrer.

Shrubs, mostly Natives of North America, and used in Basket-making.



Kinds all, or all but *S.* confórmis *Forbes*, natives of North America. The kinds which Mr. Borrer has placed in this group are *S.* rígida *Mühl.*, *S.* prinöìdes *Pursh*, and *S.* confórmis *Forbes*. To these *S.* díscolor *Willd.* and *S.* angustàta *Pursh* have been added, from their resemblance to *S.* prinöìdes.

31. *S.* RI'GIDA *Mühlenb.* The stiff-*leaved* Willow.

Identification. Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 237.; Willd. Sp. Pl., 4. p. 667.; Mühlenb. in Sims and Kön. Ann. of Bot., 2. 64.; Pursh Fl. Amer. Sept., 2. p. 615.; Smith in Rees's Cyclo., No. 31.; Forbes in Sal. Wob., No. 141.
Synonymes. *S.* cordàta *Michx. Fl. Bor.-Amer.*, 2. p. 225.; *S.* cordifòlia *Herb. Banks MSS.*
The Sexes. The female is noticed in the specific character.
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 4.; Ann. of Bot., t. 5. f. 4.; Sal. Wob., No. 141., a leaf; and *fig.* 141. in p. 1630.

Spec. Char., &c. Leaves elliptic-lanceolate, rigid, smooth, sharply serrated; the two lowest serratures elongated. Footstalks hairy. Stipules dilated, rounded, having glandular serratures. Catkins accompanying the leaves. Stamens to a flower mostly 3. Bracteas woolly. Ovary lanceolate, glabrous, on a long stalk. Style the length of the divided stigmas. (*Pursh.*) A native of North America, from New England to Virginia, in swamps and hedges. The branches are green, red towards the end, and the younger ones pubescent. It is very tough, and is much used in America by basket-makers. (*Pursh.*) Introduced in 1811, and flowering in April and May.

32. *S.* PRINÖÌ'DES *Pursh.* The Prinos-like Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 613.; Smith in Rees's Cycl., No. 26.; Forbes in Sal Wob., No. 40.; Koch Comm., p. 46. note*.
The Sexes. The female is figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 40.; our *fig.* 1317.; and *fig.* 40. in p. 1612.

Spec. Char., &c. Leaves oval-oblong, acute, with distant wavy serratures; glabrous above, glaucous beneath. Stipules half-heart-shaped, deeply toothed. Catkins villous, protruded before the leaves. Ovary stalked, ovate, pointed, silky. Style elongated. Stigmas cloven. (*Pursh.*) A native of North America, on the banks of rivers, from Pennsylvania to Virginia, where it forms a middle-sized tree, resembling *S.* díscolor; flowering in March and April. It was introduced in 1811. In the Horticultural Society's Garden, and in the salictum at Woburn Abbey, it has only attained the height of 6 ft. or 8 ft. There are plants of it at Henfield.

1317



33. *S.* DI'SCOLOR *Mühlenb.* The two-coloured Willow.

Identification. Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 234. t. 6. f. 1.; Willd. Sp. Pl., 4. p. 665.; Mühlenb. in Sims and König's Ann. of Bot., v. 2. 62. t. 5. f. 1.; Pursh Fl. Amer. Sept., 2. p. 613.; Smith in Rees's Cyclo., No. 25.; Forbes in Sal. Wob., No. 147. p. 279.
The Sexes. Both sexes are noticed in the specific character.
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 1.; Ann. of Bot., 2. t. 5. f. 1.; Sal. Wob., No. 147., a leaf; and our *fig.* 147. in p. 1630.

Spec. Char., &c. Leaves ovate-lanceolate, glabrous, bluntly serrated, glaucous beneath. Catkins

protruded before the leaves. Bracteas short, rounded, hairy. Ovary awl-shaped, silky, on a stalk thrice the length of the bractea. (*Smith* in *Rees's Cyclo.*) A native of North America, and common in low grounds and on the banks of rivers, from New England to Carolina. It is striking in its appearance, from the dark brown of its branches; and from its flowers, the filaments of which are white, and the anthers first red, becoming yellow when they burst. According to Pursh, this kind is the one most commonly used in America by the basket-makers. (*Fl. Amer. Sept.*, vol. ii. p. 613.) Introduced in 1811; but we have not seen the plant.

■ 34. *S.* ANGUSTA'TA *Pursh.* The narrowed, *or tapered-leaved*, Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 613.; Smith in Rees's Cyclo., No. 27.
The Sexes. The female is noticed in the specific character.

Spec. Char., &c. Leaves lanceolate, acute, very long, gradually tapering to the base, finely serrated, glabrous, scarcely paler on the under surface. Stipules half-heart-shaped. Catkins protruded before the leaves, upright, rather glabrous. Ovary ovate, glabrous, stalked. Style divided. Stigmas 2-lobed. A native of North America, and found in shady woods on the banks of rivers, in the states of New York and Pennsylvania; flowering in March and April. It has very long leaves, and resembles *S.* prinöides. (*Id.*) Introduced into England in 1811.

■ 35. *S.* CONFO'RMIS *Forbes.* The uniform-*leaved* Willow.

Identification. Forbes in Sal. Wob., No. 24.
The Sexes. The female only is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 24.; and *fig.* 24. in p. 1607.

Spec. Char., &c. Stem erect. Leaves lanceolate, pointed, tapering towards the base, dull green; glabrous and shining above, glabrous and glaucous beneath. Stipules ovate, or half-heart-shaped, serrated. Catkins from 2 in. to nearly 3 in. long. Ovary ovate, subulate, silky. Style about as long as the deeply parted stigmas. (*Sal. Wob.*, p. 47.) Supposed to be a native of North America. It is one of the earliest-flowering of the species; the catkins of the female plant appearing in February or March. Mr. Forbes has not seen the barren catkins; but the plant, he says, is easily distinguished by its long handsome leaves, its upright mode of growth, and its long tough branches. The last property, Mr. Forbes observes, appears to render it well adapted for basketwork.

Group ix. *Griseæ* Borrer.

Chiefly Shrubs, Natives of North America.



Most of the kinds are natives of North America. *S.* Mühlenbergiàna Willd., *S.* cordàta *Mühlenb.*, *S.* falcàta *Pursh* and *S.* trístis *Ait.* are additions to the kinds which Mr. Borrer has placed in this group. With regard to *S.* refléxa *Forbes*, *S.* virgàta ? *Forbes*, and *S.* Lyònii ? Schl., included in it by Mr. Borrer, he remarks, "I am unacquainted with these, and have, perhaps, placed them in the wrong group."

■ 36. *S.* VIRE'SCENS *Forbes.* The greenish-*leaved* Willow, *or verdant Osier.*

Identification. Forbes in Sal. Wob., No. 7.
Synonyme. Mr. Forbes received the kind from Messrs. Loddiges, under the name *S.* hippophaefòlia, but has substituted the specific name of viréscens, as being one more descriptive of the plant.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 7.; our *fig.* 1318.; and *fig.* 7. in p. 1604.

Spec. Char., &c. Leaves linear-lanceolate, serrated, acute, smooth, green on both sides. Ovary ovate-lanceolate, scarcely downy. Style divided. Stigmas parted. Stipules none. (*Sal. Wob.*, p. 13.) A native of Switzerland, and sent by Messrs. Loddiges to the Woburn salictum, where it flowers in April. This is an upright shrub, about 8 ft. high, with slender, brown, smooth branches; the young twigs yellowish, and somewhat furrowed; and the catkins long and slender, and appearing with the leaves. In foliage and branches, it bears a strong affinity to *S.* rùbra *Smith*: but "the catkins, &c.," are very different; much resembling those of *S.* undulàta *Forbes*. *S.* viréscens is of dwarfer stature than either *S.* rùbra or *S.* undulàta. There are plants at Woburn Abbey,



1318

Henfield, and Flitwick House, and also in the Hackney arboretum, under the name of *S. hippophaefòlia*. The shoots are as valuable for basketwork as those of *S.* rùbra. (*Forbes.*)

37. *S.* reflé'xa *Forbes.* The reflexed-*catkined* Willow.

Identification. Forbes in Sal. Wob., No. 94.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 94.; and our *fig.* 94. in p. 1619.

Spec. Char., &c. Leaves lanceolate, dentated, or distantly serrated; cottony beneath; the older ones glaucous and glabrous. Stipules toothed, large, on shortish footstalks. Catkins reflexed, on short stalks. Ovary stalked, ovate, silky. Style short, divided. Stigmas parted. Bractea longer than the stalk of the ovary, obovate, obtuse, notched, hairy, black in its upper half. (*Sal. Wob.*, p. 187.) A low spreading shrub; native country not stated; flowering in March; with round green branches, villous when young, marked with small yellow dots. Leaves from 3 in. to 3½ in. long, scarcely 1 in. in breadth; lanceolate, tapering towards their extremities, serrated, entire at the base; thickly covered with a short cottony substance, while young, underneath; finally, they lose this substance, and become perfectly glabrous and glaucous; the young ones are tinged with purple, and very soft to the touch: lower leaves very small, and obtuse. Catkins about 1 in. long, recurved, slender. A very useful willow for tying, and for the finer sorts of baskets and wickerwork, the younger twigs being very tough and pliant.

38. *S.* virga'ta *Forbes.* The twiggy Willow.

Identification. Forbes in Sal. Wob., No. 12.
The Sexes. Mr. Forbes states that, when seen by him, the catkins were withered, and unfit for examination.
Engravings. Sal. Wob., No. 12., without flowers; and our *fig.* 12. in p. 1605.

Spec. Char., &c. Leaves linear-lanceolate, glabrous, green on both surfaces, finely serrated. Stipules rounded or half-heart-shaped, serrated or toothed. Branches glabrous, shining. (*Sal. Wob.*, p. 23.) A very distinct and handsome sort, growing, in the Horticultural Society's Garden at Chiswick, to the height of 1 ft. 6 in. or 2 ft., with small round, brown, glabrous, twiggy branches; flowering in May and June. In size, habit, and leaves it resembles *S.* Houston*iàna*.

39. *S.* Lyo'*nii* ? Schl. Lyon's Willow.

Identification. Sal. Wob., No. 12. Mr. Forbes obtained this sort, under the name of *S.* Lyòn*ii*, from Messrs. Loddiges, who had it, through M. Schleicher, from Switzerland.
The Sexes. Mr. Forbes had not yet seen the catkins in 1829, when the *Salictum Woburnense* was published.
Engravings. Sal. Wob., No. 10., without flowers; and our *fig.* 10. in p. 1604.

Spec. Char., &c. Leaves alternate, lanceolate, elongated, pointed, serrated, glabrous, green and shining on both sides, veiny; obtuse at the base, sometimes furnished with one or two glands. Branches round, glabrous, inclining to a reddish brown. (*Sal. Wob.*, p. 19.) A native of Switzerland, introduced by Messrs. Loddiges previously to 1829, the date of the *Salictum Woburnense*. In the salictum at Woburn, it forms a bushy shrub, about 3 ft. in height, with reddish brown branches, which are round, glabrous, and shining; these, again, throwing out many small twigs from the axils of the leaves, which are villous when young. This species has not yet flowered with Mr. Forbes, who has given the figure without catkins.

40. *S.* Houston*ia'na* Pursh. Houston's Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 634.; Smith in Rees's Cyclo., No. 43.; Forbes in Sal. Wob., No. 11.
Synonyme. S. tristis *Lodd. Cat.*, ed. 1836.
The Sexes. The male is described in Pursh's specific character, and the female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 11.; and *fig.* 11. in p. 1604.

Spec. Char., &c. Leaves linear-lanceolate, and very finely serrated, glabrous, shining, and green on both sides. Stipules none. Catkins accompanying

the leaves, cylindrical, villous. Bracteas ovate, acute. Stamens 3 to 5, bearded half-way up. Branches extremely brittle at the base. (*Pursh.*) A native of Virginia and Carolina. In the salictum at Woburn, it is a low-growing shrub, with slender, roundish, smooth, yellowish branches, rising about 3 ft. or 4 ft. high; flowering in May and June. "This species," Pursh observes, "so frequently found in gardens under the name of *S.* trístis, is very far from being in any way related to it. The specimen in the Banksian herbarium was collected by Houston, and, as it is said, in Vera Cruz; but I am confident that it is a more northern plant, as I have frequently seen it in Virginia." (*Fl. Amer. Sept.*, ii. p. 614.) There are plants in the Goldworth Arboretum, and at Woburn Abbey, Henfield, and Flitwick House; also in the arboretum at Hackney, under the name of *S.* trístis.

41. *S.* FALCA'TA *Pursh.* The sickle-*leaved* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 614.; Smith in Rees's Cyclo., No. 44.; Forbes in Sal. Wob., No. 148.

Engravings. Sal. Wob., No. 148., a leaf; and our *fig.* 148. in p. 1630.

Spec. Char., &c. Leaves very long, linear-lanceolate, closely serrated, tapering gradually, and somewhat falcate upwards; acute at the base; glabrous on both surfaces; when young, silky. Stipules crescent-shaped, toothed, deflexed. A very smooth species, with very slender brown branches: flowers not yet observed. (*Pursh.*) A native of North America, from Pennsylvania to Virginia, on the banks of rivers. Introduced in 1811, and flowering in April and May; but we have never seen the plant.

42. *S.* GRI'SEA *Willd.* The grey Willow.

Identification. Willd. Sp. Pl., 4. p. 699.; Pursh Fl. Amer. Sept., 2. p. 615.; Smith in Rees's Cyclo., No. 113.; Koch Comm., p. 21., note *.

Synonymes. *S. sericea Mühlenb. Nov. Act. Soc. Nat. Scrut. Berol.*, 4. p. 239. t. 6. f. 8.; *Sims et König Ann. of Bot.*, 2. 67. t. 5. f. 8. Perhaps the *S.* pennsylvánica *Forbes* in *Sal. Wob.*, No. 95., is the *S.* grísea *Willd.* (*Borrer* in a letter.)

The Sexes. Both sexes are described in *Willd. Sp. Pl.*, and in *Rees's Cyclo.*: they are more briefly noticed in the specific character below.

Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 8.; Ann. of Bot., 2. t. 5. f. 8.

Spec. Char., &c. Petiole long, silky. Disk of leaf lanceolate, acuminate, serrulate; glabrous on the the upper surface, silky on the under one. Stipules linear. Stamens 2. Ovary silky, oblong. Stigmas sessile, obtuse. (*Willd.* and *Mühlenb.*) Wild in marshes in Pennsylvania. A shrub of man's height. Branches brown, downy when young. Disk of leaf $1\frac{1}{2}$ in. long. Catkins protruded earlier than the leaves. (*Willd.*) Introduced in 1820.

Variety.

S. g. 2 *glàbra*.—Glabrous. Koch considers this the same as the *S.* petiolàris of Smith, described below, No. 43.; and asserts that it is not a native of Britain, though Smith has included it in his *English Flora*.

43. *S.* PETIOLA'RIS *Smith.* The *long*-petiolated Willow.

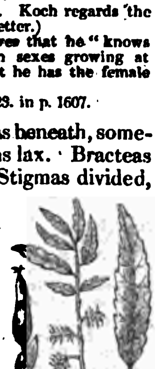
Identification. Smith in Lin. Soc. Trans., 6. p. 122.; Eng. Bot., t. 1147.; Willd. Sp. Pl., 4. p. 665.; Pursh Fl. Amer. Sept., 2. p. 616.; Smith in Rees's Cyclo., No. 28.; Eng. Fl., 4. p. 181.; Forbes in Sal. Wob., No. 23.; Hook. Br. Fl., ed. 3., p. 423.

Synonymes. *S.* grísea *Willd.* var. β subglabràta *Koch Comm.*, p. 21., note *. Koch regards the *S.* petiolàris *Smith* as a var of *S.* grísea; and it probably is so. (*Borrer* in a letter.)

The Sexes. The female is figured in *Eng. Bot.* and *Sal. Wob.* Smith observes that he "knows nothing of the male plant." (*Eng. Fl.*) Mr. Borrer had formerly both sexes growing at Henfield, having received the male from Mr. G. Anderson, but at present he has the female only. (*W. B.*)

Engravings. Eng. Bot., t. 1147.; Sal. Wob., No. 23.; our *fig.* 1319.; and *fig.* 23. in p. 1607.

Spec. Char., &c. Leaves lanceolate, serrated, glabrous; glaucous beneath, somewhat unequal at the base. Stipules lunate, toothed. Catkins lax. Bracteas hairy, shorter than the stalks of the ovate silky ovaries. Stigmas divided, sessile. (*Smith Eng. Fl.*) A native of Scotland, in Angusshire and other places; forming a bushy tree, with slender, spreading, flexible, smooth, purplish, or dark brown branches; flowering in April. It is easily known from every other species, by its short obtuse catkins, and long dark leaves. After gathering, the young leaves especially exhale a strong scent, like the flavour of bitter almonds, but less agreeable. No use has been made of this willow, though it seems to abound in tannin." (*Smith* in *Eng. Fl.*) "Sent from Scotland by the late Mr. Dickson. In Possil Marsh, on the north side of the canal; Mr. David Don. Marshes in Angusshire; Mr. George Don. (*Hooker.*) Mr. Pursh has suspected it not to be



1319

truly British; but there seems no reason why, like several other willows, it may not grow wild in Europe as well as in North America; and the authorities above mentioned are not likely to be erroneous." (*Smith.*) "I have never seen native specimens." (*Hooker* in *Br. Fl.*)

44. *S.* PENNSYLVA'NICA *Forbes.* The Pennsylvanian Willow.

Identification. Forbes in Sal. Wob., No. 95.
Synonymes. ? Is not this the same as *S.* petiolàris *Smith*; or, perhaps, it is the *S.* grísea *Willd.* (*Borrer* in a letter.) In Sweet's *Hort. Brit.*, ed. 1830, it is questioned if *S.* pennsylvánica *Forbes* be not identical with *S.* pedicellàris of *Spreng. Syst.*, which is the *S.* pedicellàris *Pursh.*
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 95.; and our *fig.* 95. in p. 1620.

Spec. Char., &c. A bushy shrub. Leaves alternate, lanceolate, serrated; smooth, glabrous, and shining above; densely clothed beneath with silky silvery hairs. Stipules very minute, soon falling off. Catkins of the male nearly 1 in. long, slender. Bractea oblong, hairy. Gland obtuse. This kind, in its whole form and habit, bears a strong likeness to *S.* petiolàris *Smith*; but the silvery silkiness of the old leaves perfectly distinguishes it. (*Sal. Wob.*, p. 189.) A native of ? North America; flowering in April. Introduced in (?) 1825. A low spreading shrub, with yellowish green, round, villous, brittle branches. Leaves lance-shaped, varying from 3 in. to 5 in. in length, sometimes nearly 1 in. broad; dark green and shining above; beautifully silvery-silky beneath; all the leaves of a thin texture; midrib pale, prominent, and slightly villous. Footstalks scarcely ½ in. long. Catkins appearing before the leaves, nearly sessile. Anthers reddish before expansion; afterwards yellow. There are plants in the Goldworth Arboretum, and at Woburn Abbey and Flitwick House.

45. *S.* MÜHLENBERGIA'NA Willd. Mühlenberg's, *or the brown American*, Willow.

Identification. Willd. Sp. Pl., 4. p. 692.; Pursh Fl. Amer. Sept., 2. p. 609.; Smith in Rees's Cyclo., No. 96.; Forbes in Sal. Wob., No. 145. p. 278.; Koch Comm., p. 21., note *.
Synonymes. *S.* alpìna *Walt. Car.*, 243.; *S.* incàna *Michx. Fl. Bor. Amer.*, 2. p. 225.; *S.* flàva *Schoepf. Mat. Med. Amer.*; *S.* trístis *Mühlenb. Nov. Act. Soc. Nat. Scrut. Berol.*, 4. p. 241. t. 6. f. 9., *Sims and König's Ann. of Bot.*, 2. p. 68. t. 5. f. 9.
The Sexes. Both sexes are noticed in the specific character.
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 9.; Ann. of Bot., 2. t. 5. f. 9., a leaf; Sal. Wob., No. 145.; and our *fig.* 145. in p. 1630.

Spec. Char., &c. Leaves lanceolate, sharpish, nearly entire, downy, revolute; veiny and rugose beneath. Stipules lanceolate, deciduous. Bracteas oblong, fringed. Ovary ovate-lanceolate, silky, stalked. Style short. Stigmas divided. The branches greenish yellow, with black dots. Anthers purple; yellow when they burst. Bracteas white, tipped with red, giving the catkins a very pleasing appearance. (*Pursh.*) A shrub, 1 ft. to 4 ft. high, mostly decumbent. Leaves 1 in. long, or more. It is indigenous in gravelly places in Pennsylvania and Canada (*Willd.*); or, according to Pursh, in shady dry woods, from New York to Virginia. Introduced in 1811, and flowering in April.

46. *S.* TRI'STIS *Ait.* The sad, *or narrow-leaved American*, Willow.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 393.; Willd. Sp. Pl., 4. p. 693., Pursh Fl. Amer. Sept., 2. p. 609.; Smith in Rees's Cyclo., No. 97.; Forbes in Sal. Wob., No. 150. p. 279.
Engravings. Sal. Wob., No. 150., a leaf; and our *fig.* 150. in p. 1630.

Spec. Char., &c. Leaves linear-lanceolate, entire, revolute, acute at each end; rather glabrous above, rugged with veins and downy beneath. Stipules none. Catkins appearing before the leaves, and oblong. Approaches near to *S.* Mühlenbergiàna. (*Pursh.*) A native of North America, in dry sandy woods, from New Jersey to Carolina. Introduced in 1765, and flowering in April.

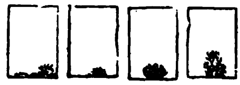
47. *S.* CORDA'TA *Mühlenb.* The heart-*leaved* Willow.

Identification. Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 236.; Willd. Sp. Pl., 4. p. 666.; Mühlenb. in Sims et Kön. Ann. of Bot., 2. p. 64.; Pursh Fl. Amer. Sept., 2. p. 615.; Smith in Rees's Cyclo., No. 30.; Forbes in Sal. Wob., No. 142.
The Sexes. Both sexes are noticed in the specific character.
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 3.; Ann. of Bot., t. 5. f. 3.; Sal. Wob., No. 142., a leaf; and our *fig.* 142. in p. 1630.

Spec. Char., &c. Branches green, red towards the end; younger ones pubescent. Leaves ovate-lanceolate, serrated, smooth; above deep green, paler beneath, heart-shaped at the base. Stipules rounded, finely toothed. Catkins accompanying the leaves. Stamens to a flower mostly 3. Flowers lanceolate, woolly. Ovary stalked, lanceolate, smooth. Style the length of the divided stigmas. (*Pursh.*) A native of North America, from New England to Virginia. Introduced in 1811, and flowering in April and May. The young shoots are very tough, and are much used in America by the basket-makers. A shrub, about 6 ft. high, with green glabrous branches, and long leaves. (*Willd.*) There are plants in the Goldworth Arboretum.

Group x. Rosmarinifòliæ Borrer.

Low Shrubs, with narrow Leaves.



Stamens 2 to a flower. Ovary silky, stalked. Catkins short. Flowers loosely disposed in the catkin. Leaves linear-lanceolate, entire, or toothed with extremely minute glanded teeth. Plants small upright shrubs. (*Hook. Br. Fl.*, ed. 2.)

48. *S.* ROSMARINIFO'LIA *L.* The Rosemary-leaved Willow.

Identification. Lin. Sp. Pl., 1448.; Willd. Sp. Pl., 4. p. 697.; Hayne Abbild., p. 244.; Pursh Fl. Amer. Sept., 2. p. 612.; Smith in Rees's Cyclo., No. 109.; Eng. Bot., t. 1365.; Eng. Fl., 4. p. 214.; Forbes in Sal. Wob., No. 87.; Hook. Br. Fl., ed. 3. p. 423.

Synonyme. *S.* rosmarinifòlia, part of, *Koch Comm.*, p. 49.

The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* Smith has noted that he had not seen the catkins of the male. This is originally described, and both sexes are figured, in *Sal. Wob.* Both are described in *Willd. Sp. Pl.*, and figured in *Hayne Abbild.*

Engravings. Hayne Abbild., t. 186.; Eng. Bot., t. 1365.; Sal. Wob., No. 87.; our *fig.* 1320.; and *fig.* 87. in p. 1618.

Spec. Char., &c. Leaves linear-lanceolate, silky, quite entire, or with a few very minute glanded teeth, especially the young leaves. Catkins shortly oblong, curved, lax. Ovaries stalked, silky, lanceolate-acuminate. Style about as long as the linear divided stigmas. Bracteas short, villous. (*Hook. Br. Fl.*, ed. 3.) "Native of moist sandy or turfy places in Sweden, Germany, and the northern parts of Britain; flowering in April. Pursh, finding it likewise 'in wet meadows and mountain swamps from Pennsylvania to Carolina,' presumes that it has been imported thence into England. Our specimens, however, accord exactly with the Finland ones of Linnæus, and the German one of Ehrhart, so that it seems common to both quarters of the world." (*Smith* in *Rees's Cyclo.*) Flowering in April and May. A slender upright shrub, 2 ft. or 3 ft. high; allied in its habits (silky silvery foliage, and short ovate catkins) to *S.* angustifòlia ? *Wulf.*, *Borrer*, *Hooker*; but much more silky or downy; and the catkins, at first, are singularly recurved. The branches are upright, very slender, round, silky when young. Leaves scattered, on short slender stalks, nearly upright, straight, linear-lanceolate, acute, hardly ever more than ¼ in. broad at most, and from 1 in. to 2 in. long; entire, sometimes beset with a few marginal glands; the upper surface silky when young, but soon becoming glabrous and veiny, of a rather light green, scarcely blackened in drying; under surface glaucous, and at every period more or less silky. Catkins lateral; at first drooping, ovate, and very short, but, as they advance, becoming more erect. The ovaries of this species are smaller, and more awl-shaped, than in *S.* angustifòlia *Borrer*, *Hooker*, ? *Wulf.*



1320

49. *S.* ANGUSTIFO'LIA *Borrer, Hooker,* ? *Wulf.* The narrow-leaved Willow.

Identification. Borrer and Hook. in Hook. Br. Fl., ed. 2., p. 417.; ? Wulf. in Jacq. Coll., 3. 48.

Synonymes. *S.* arbúscula *Smith Fl. Brit.*, p. 1050., *Eng. Bot.*, t. 1366., *Rees's Cyclopædia*, No. 65., *Eng. Flora*, 4. p. 198., exclusively of the synonymes of Lin., perhaps of other synonymes, *Forbes* in *Sal. Wob.*, No. 86., not No. 188.; *S.* rosmarinifòlia α *Koch Comm.*, p. 49. Smith, in his *Eng. Flora*, has referred *S.* angustifòlia *Wulf.* to *S.* incubàcea *L.*; and Koch has referred *S.* incubàcea *L.* to *S.* rosmarinifòlia *L.*

The Sexes. The female is described in *Eng. Flora*, and figured in *Eng. Bot.* and *Sal. Wob.* Smith has noted, in *Eng. Flora*, that the flowers of the male were unknown to him.

Engravings. Eng. Bot., t. 1366.; the female, Sal. Wob., t. 86.; our *fig.* 1321.; and *fig.* 86. in p. 1618.

Spec. Char., &c. Leaves linear-lanceolate, nearly glabrous, with minute glandular teeth; the young leaves silky; glaucous beneath. Catkins ovate, erect. Ovaries ovate-acuminate, densely silky, stalked. Style about as long as the broad, erect, entire stigmas. Bracteas very villous, nearly as long as the young

ovaries. (*Hook. Br. Fl.*, p. 417.) A native of Scotland, on the Clova Mountains, and also near Dumfries; growing to the height of 1 ft., and flowering in April. Botanists are not agreed as to what is precisely the *S.* arbúscula *L.* Smith deemed it to be this; but Mr. Forbes (*Sal. Wob.*, No. 86., and incidentally under No. 138.) and Mr. Borrer (*Hook. Br. Fl.*, ed. 2.) have concluded that it is not. Mr. Forbes was much inclined to regard it as not specifically distinct from *S.* rosmarinifòlia *Eng. Fl.* and *Eng. Bot.*; and Mr. Borrer, or Sir W. J. Hooker, or both, have regarded it as probably the same as the *S.* angustifòlia *Wulfen*. As to its relation to *S.* rosmarinifòlia, Sir W. J. Hooker says, "I agree with Mr. Borrer in thinking that they are distinct, though the difference lies almost entirely in their ovaries: these are shorter in *S.* angustifòlia, with denser, less glossy, and less truly silky hairs, with ovate and quite entire stigmas, and more shaggy bracteas. There are plants at Woburn and Flitwick.



1321

✱ 50. *S.* DECU'MBENS *Forbes*. The decumbent Willow.

Identification. Forbes in Sal. Wob., No. 88.
The Sexes. The female is described and figured in *Sal Wob.*
Engravings. Sal. Wob., No. 88.; and *fig.* 88. in p. 1618.

Spec. Char., &c. Leaves linear-lanceolate, nearly entire; dull green and silky above, pale and densely silky beneath. Stipules lanceolate. Branches downy. Ovary ovate, silky, nearly sessile. Style elongated. Stigmas divided. (*Sal. Wob.*, p. 175.) A native of ? Switzerland. Introduced in 1823, and flowering in May. A small shrub, with leafy downy branches, extending obliquely from the ground to the height of 1 ft. or 1 ft. 6 in. The leaves are from 1½ in. to 2 in. long, or more; linear-lanceolate, entire, or nearly so, some of them marked with a few glands about the middle; dull green and silky above, beneath densely silky; the young ones have somewhat a silvery appearance underneath. Buds red before expansion. Catkins nearly 1 in. long. A very distinct species, resembling in foliage the male plant of *S.* rosmarinifòlia.

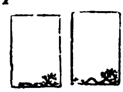
♠ 51. *S.* FUSCA'TA *Pursh*. The *dark*-brown-*branched* Willow.

Identification. Pursh Fl. Amer. Sept., 8. p. 612.; Smith in Rees's Cyclo., No. 110.
The Sexes. The female is noticed in the specific character.

Spec. Char., &c. Leaves obovate-lanceolate, acute, somewhat serrated; glaucous beneath, downy when very young. Stipules minute. Catkins drooping. Bracteas (scales) obtuse, scarcely hairy on the inside. Ovary ovate, silky, somewhat stalked. Wild in North America, in low overflowed grounds on the banks of rivers, from New York to Pennsylvania; flowering in March or April. Branches of the preceding year covered with a dark brown or black tomentum. (*Pursh* and *Smith.*) Introduced in 1811.

Group xi. *Fúscæ* Borrer.

Mostly procumbent Shrubs.



Stamens 2 to a flower, as far as to the kinds whose male flowers have been observed. Ovary silky, stalked. Catkins ovate or cylindrical. Leaves between elliptical and lanceolate; mostly silky beneath; nearly entire. Plants small shrubs. Stem, in most, procumbent. *S.* fúsca *L.*, *Hooker*, var. 1., and *S.* Doniàna Smith, have a likeness in aspect to the kinds of the group Purpùreæ, except *S.* rùbra *Huds.* (*Hook. Br. Fl.*, ed. 2., adapted.)

✱ 52. *S.* FU'SCA *L.* The brown Willow.

Identification. Hook. Br. Fl., ed. 2., p. 417.; ? Hayne Abbild., p. 242.
Synonymes. *S.* rèpens *Hook. Fl. Scot.*, 1. p. 284.; *S.* rèpens *Koch*, part of, *Koch Comm.*, p. 47. The various synonymes to be cited below in application to varieties are, in effect, synonymes of the species also.
The Sexes. The female is figured in *Hayne Abbild.*, if the *S.* fúsca of that work is the *S.* fúsca *L.*
Engravings. Hayne Abbild., t. 184.; Sal. Wob.; and our *fig.* 83. in p. 1618.

Spec. Char., &c. Stems more or less procumbent. Leaves elliptical or elliptic-lanceolate, acute; entire, or serrated with minute glanded serratures; somewhat downy; glaucous, and generally very silky beneath. Ovary lanceolate, very silky, seated upon a long stalk. Stigmas bifid. (*Hook. Br. Fl.*, ed. 2.) Sir W. J. Hooker and Mr. Borrer have referred to this species several kinds as varieties, which have been regarded as species by Smith and others, and which we give below, retaining the specific character of each, for the convenience of those who have received them as species, and may wish to identify them.

Varieties.

* S. *f.* 1 *vulgàris;* *S.* f. var. *α Hook. Br. Fl.*, ed. 2.; *S.* fúsca *Smith Eng. Bot.*, t. 1960., *Eng. Fl.*, iv. p. 210., *Forbes* in *Sal. Wob.*, No. 83.; *S.* rèpens *Koch β Koch Comm.*, p. 47.; and our *fig.* 83. in p. 1618.—Stem decumbent below, then upright, much branched. Leaves elliptic lanceolate. (*Id.*) Mr. Borrer is disposed to deem the *S.* fúsca *Smith* different from the *S.* fúsca *L.*, at least as seen growing in the garden; for he allows that "the dried specimens show no character;" in which latter opinion I cordially agree with him." (*Hooker.*) "The plant" of Smith "itself is usually a small procumbent shrub, with rather long straight branches; but varying exceedingly, according to situation and other circumstances, as do the leaves also, which are more or less glabrous above, and more or less silky beneath, where the nerves are prominent." (*Id.*) The branches are spreading, brown, and downy, with fine close hairs when young. (*Smith.*) Catkins generally appearing before the leaves. A very beautiful little species, nearly related to *S.* f. rèpens; but is distinguishable from it by its broader leaves, longer footstalks, and more upright mode of growth. Smith states that it is found wild in moist mountainous heaths in the north; that its time of flowering is May. In the salictum at Woburn, it flowered in May, and again in July. The male plant is figured in the *English Botany* and the *Salictum Woburnense.* There are plants at Woburn Abbey, Henfield, and Flitwick House.
* S. *f.* 2 *rèpens;* *S.* f. *β Hook. Br. Fl.*, ed. 2.; *S.* rèpens *Lin. Sp. Pl.*, 1447. (*Smith*), *Willd. Sp. Pl.*, iv. p. 693., at least in part, *Smith* in *Rees's Cyclo.*, No. 100., *Eng. Bot.*, t. 183., *Eng. Fl.*, iv. p. 209., *Forbes* in *Sal. Wob.*, No. 84., our *fig.* 84. in p. 1618., ? *Hayne Abbild.*, p. 241. t. 183., ? *Pursh Fl. Amer.*, ii. p. 610.; *S.* rèpens *Koch α Koch Comm.*, p. 47.—The following description of this kind is derived from *Eng. Fl.* and *Sal. Wob.*: — Leaves elliptic-lanceolate, straight, somewhat pointed, nearly entire; almost naked above, glaucous and silky beneath. Stipules none. Stem depressed, with short upright branches. Ovary stalked, ovate, downy. Capsules glabrous. (*Smith E. F.*) A native of Britain, on moist and dry heaths, moors, and sandy situations; flowering in May. Stem woody, depressed, often creeping; sending up numerous upright branches, about a finger's length; sometimes subdivided and spreading; sometimes procumbent and moderately elongated; all round and glabrous, except the small leafy shoots of the present year, which are downy. Leaves small, from ¼ in. to ¾ in. long, elliptical or broadly lanceolate, somewhat revolute; nearly or quite entire, veiny, bluntish, with a minute straight point; the upper surface dark green, glabrous; under surface glaucous, densely silky when young. Footstalks short and broad, frequently downy. Catkins appearing before the leaves, numerous, and attaining 1 in. in length, in the fertile plant, when the seeds are ripe. Both sexes are described in *Eng. Flora*, and both are figured in *Eng. Bot.*, in *Sal. Wob.*, and in *Hayne Abbild.*, if the latter engraving belongs to this willow. There are plants at Woburn Abbey and in the Goldworth Arboretum.
* S. *f.* 3 *prostràta;* *S.* f. var. *γ Hook. Br. Fl.*, ed. 2.; *S.* prostràta *Smith*

Eng. Bot., t. 1959., *Rees's Cyclo.*, No. 105., *Willd. Sp. Pl.*, iv. p. 695., *Smith Eng. Fl.*, iv., p. 211., exclusively of the locality ("in Epping Forest"), *Forbes* in *Sal. Wob.*, No. 82., and our *fig.* 82. in p. 1618. — The following particulars respecting this kind are derived from *Eng. Fl.* and *Sal. Wob.*, chiefly from the former : — Leaves elliptic-oblong, convex, somewhat toothed, with a curved point; glaucous, silky, and veiny beneath. Stipules minute. Stem prostrate, with elongated straight branches. Ovary stalked, ovate, silky. Styles shorter than the stigmas. (*Sal. Wob.*, p. 163.) A native of Britain, in moist and dry moors, heaths, and sandy situations; flowering in May. Root woody, rather long and slender. The stems compose an entangled mat several feet in diameter, with straight, slender, round, leafy, tough, downy or silky branches; 1 ft. or more in length; spreading close to the ground in every direction, with a few short upright ones occasionally. Leaves elliptic-oblong, numerous, scattered, on short and rather thick stalks, ascending; 1 in. long, convex, but scarcely revolute; partly entire, partly toothed; the point recurved or twisted; the upper side dark green, obscurely downy, veiny; under side concave, glaucous, rugged, with prominent veins, and silky, especially while young. Catkins numerous, appearing before the leaves; ½ in. long. Distinguished from *S.* fúsca vulgàris by its longer prostrate branches, and broader leaves. Both sexes are described in *Eng. Fl.;* the female is figured in *Eng. Bot.* and in *Sal. Wob.* There are plants at Woburn Abbey and Flitwick House, and also in the Goldworth Arboretum. "*S.* prostràta and *S.* rèpens," Dr. Johnston observes, "have been confidently pronounced varieties of the same species by some botanists of deserved eminence, while others, not less eminent, consider them 'totally distinct.' Both plants are familiar to me; and I cannot hesitate to rank myself with those who are of the latter opinion. *S.* prostràta is the larger species, sending up from its prostrate stem straight simple branches, 1 ft. or more in length, which are clothed with alternate leaves, rather more than 1 in. long, and one half as broad. *S.* rèpens, on the contrary, is a much branched creeping shrub, whose numerous branches scarcely rise above the grass. The leaves are more closely set, of a lighter green, and rarely one half so large. A general dissimilarity in habit should surely keep plants separate, though they may agree in some minute characters." (*Flora of Berwick upon Tweed*, vol. i. p. 214.)

✱ S. *f.* 4 *fœ'tida ; S.* f. var. δ *Hook. Br. Fl.*, ed. 2.; *S.* fœ'tida *Smith Eng. Fl.*, iv. p. 208. — Stem recumbent. Leaves elliptical. (*Hooker.*) Smith has constituted his *S.* fœ'tida of two kinds, that he had previously published as species, by the names *S.* adscéndens *Smith* and *S.* parvifòlia *Smith.* These two kinds may be here noticed separately, as constituting together Hooker's *S.* fúsca δ.

✱ *S.* adscéndens *Smith* in *Eng. Bot.*, 1962., *Rees's Cyclo.*, No. 103., *Forbes* in *Sal. Wob.*, No. 80., our *fig.* 80. in p. 1618. ; *S.* fœ'tida, exclusively of β *Smith Eng. Fl.*, 4. p. 208.; *S.* rèpens *Koch* var. *Koch Comm.*, p. 47. — The following particulars respecting this kind are deduced from *Sal. Wob.* : — Leaves elliptical, nearly entire, with a recurved point; glaucous and silky beneath. Stem recumbent. Ovary ovate-lanceolate, on a silky stalk, nearly equal to the obovate bracteas. (*Sal. Wob.*, p. 159.) A native of Britain, in sandy heaths; flowering in May. A low creeping shrub, with long, straight, densely leafy, recumbent, or somewhat ascending, round, downy branches, silky when young. Leaves elliptical, narrower, and far less silky than those of *S.* argéntea. Mr. Forbes adds that he has observed so many points of difference between this and the following kind, that he has preferred keeping them distinct. The male is figured in *Eng. Bot.*, the female in *Sal. Wob.* There are plants at Woburn Abbey and Flitwick House.

✱ *S.* parvifòlia *Smith Eng. Bot.*, t. 1961., *Rees's Cyclo.*, No. 102., *Forbes* in *Sal. Wob.*, No. 81., *fig.* 81. in p. 1618. ; *S.* fœ'tida β *Smith Eng. Fl.*, 4. p. 208. ; *S.* rèpens *Koch* var. *Koch Comm.*, p. 48. — The following account of this kind is taken from *Sal. Wob.* : — Leaves elliptical, nearly entire, with recurved points; glaucous and silky beneath. Stem decumbent. Stipules ovate, entire. (*Sal. Wob.*, p. 161.) A native of Britain, on moist and dry heaths, on moors, and sandy situations; flowering in May, and, in the willow garden at Woburn Abbey, again in August. The

stem is much branched, elongated, and decumbent. Branches elongated, wand-like, 1 ft. or 1 ft. 6 in. long, spreading obliquely, or else procumbent; very densely clothed with innumerable leaves, round, thickish, hairy or silky. Leaves spreading or recurved, about ½ in. long, of a broad elliptical figure, with curved points; the margin slightly revolute, either quite entire, or marked here and there with a minute glandular tooth; the upper surface is of a dull lightish green, and nearly glabrous; the under surface glaucous, and more or less silky. Footstalks very short, and broad. Catkins of the female ovate, dense, yellowish. Both sexes are figured in *Sal. Wob.*; the female is described in *Eng. Bot.*

Both these kinds or subvarieties are distinguished by their strong fishy smell. "This odour becomes powerfully offensive, when fresh specimens have been confined in a box for several days." (*Eng. Fl.*, iv. p. 209.)

■ S. *f.* 5 *incubàcea*; *S.* f. 5 *Hook. Br. Fl.*, ed. 3.; *S.* incubàcea *Lin. Sp. Pl.*, 1447., *Fl. Suec.*, ed. 2., 351., *Smith Eng. Fl.*, iv. p. 212., exclusively of all the synonymes, according to *Borrer* in *Eng. Bot. Suppl.*, except the two of Linnæus quoted above, *Forbes* in *Sal. Wob.*, No. 79., our *fig.* 79. in p. 1618., *Borrer* in *Eng. Bot. Suppl.*, t. 2600., *Hayne Abbild.*, p. 243. t. 185. The female is described in *Eng. Flora* and *Eng. Bot. Suppl.*, and figured in *Eng. Bot. Suppl.*, *Sal. Wob.*, and *Hayne Abbild.*—Mr. Borrer, in *Eng. Bot. Suppl.*, has treated of this as a species, although he has since regarded it as a variety. The following is the specific character, given in *Engl. Bot. Suppl.*, and it will serve to portray the characteristic features of the kind, whether viewed as a species or a variety. Leaves elliptic-lanceolate, nearly entire, acute, with a twisted point; glaucous and silky beneath. Stipules stalked, ovate, acute. Stem procumbent. Branches erect. Catkins erect, oblong-cylindrical. Stalk of the silky ovary about as long as the obovate bractea (scale). (*Borrer.*) Wild in England, at Hopton in Suffolk, in Anglesea on sandy shores; and in Switzerland and Germany. A shrub, about 4 ft. high. It shows "the closest affinity to *S.* argéntea *Smith*, in its mode of growth, flowers, stipules, and silky pubescence; and from which it differs in little besides the shape of the leaf. Serratures are, indeed, more frequently found, and more apparent when present; but in *S.* argéntea the leaves are not always strictly entire. We have seen, on Swiss specimens, the male flowers of *S.* incubàcea, but they afford no distinctive marks." (*Borrer.*)

✱ S *f.* 6 *argéntea*; *S.* f. 6 *Hook. Br. Fl.*, ed. 2.; *S.* argéntea *Smith Eng. Bot.*, t. 1364., *Rees's Cyclo.*, No. 98., *Willd. Sp. Pl.*, iv. p. 693., *Smith Eng. Fl.*, iv. p. 206., *Walker's Essays*, p. 435., *Forbes* in *Sal. Wob.*, No 78., our *fig.* 78. in p. 1618., *Hayne Abbild.*, p. 240. t. 182.; *S.* rèpens *Koch* γ *Koch Comm.*, p. 47.—Stem erect, or spreading. Leaf elliptical, with a recurved point; the under surface very silvery. The following information on this kind is derived from *Engl. Fl.* and *Sal. Wob.*, chiefly the former:—Leaves elliptical, entire, somewhat revolute, with a recurved point; rather downy above, silky and shining beneath, as well as the branches. Stem upright. Ovary ovate-lanceolate, silky; its silky stalk nearly equal to the linear oblong bractea. Style not longer than the stigmas. (*Smith E. Fl.*) A native of England, on dry heath and sandy situations, chiefly near the sea; flowering in April and May. Stems mostly spreading, but, if sheltered, erect; 4 ft. or 5 ft. high, with numerous, upright, leafy branches, beautifully downy or silky. Leaves on short, stout, downy footstalks, scattered; 1 in., or often less, in length, and half as much in breadth; truly elliptical, with a small curved point; the margin entire, slightly revolute; the upper side of a dull green, at first silky, then downy, finally naked, reticulated with small veins; under side covered at all times with the most brilliant, silvery, satin-like, close, silky hairs, very soft, almost concealing the strong midrib and transverse veins. Catkins appearing before the leaves.

This species is readily distinguished from the remaining ones belonging to this section (with the exception of *S.* incubàcea), by its very silvery leaves and upright mode of growth. Both sexes are described in *Eng. Fl.*; the female is figured in *Sal. Wob.* and *Hayne Abbild.* There are plants at Woburn Abbey, Henfield, and Flitwick House, and also in the Goldworth Arboretum.

■ 53. *S.* DONIA'NA Smith. Don's, *or the rusty-branched*, Willow.

Identification. Smith in Eng. Fl., 4. p. 213.; Forbes in Sal. Wob., No. 85.; Hook. Br. Fl., ed. 3., p. 424.; Borrer in Eng. Bot. Suppl., t. 2599.

The Sexes. The female is described and figured in *Sal. Wob.* and *Eng. Bot.* The male has not yet been discovered.

Engravings. Sal. Wob., No. 85.; Eng. Bot., t. 2599.; our *fig.* 1322.; and *fig.* 85. in p. 1618.

Spec. Char., &c., Leaves obovate-lanceolate, partly opposite, acute, slightly serrated, even; livid and somewhat silky beneath. Stipules linear. Branches erect. Catkins erect, cylindrical. Ovary stalked, silky, longer than the obovate bearded bractea. (*Smith* and *Borrer.*) Sent from Scotland, as British, by the late Mr. George Don. It flowers in May. Stem 5 ft. or 6 ft. high, with straight, wand-like, round, leafy branches, of a reddish or rusty brown, scarcely downy, except when very young. Leaves mostly alternate, but several of the lowermost pairs opposite; all nearly upright, flat; 1¼ in. long, uniform; broadest, and most evidently serrated, in their upper part, towards the point; green, minutely veiny, and glabrous above; livid, or in some measure glaucous, as well as finely downy or silky, beneath, with a prominent reddish midrib, and slender veins; the silkiness less evident on the older ones. Footstalks short, very broad at the base, paler than the branches. Catkins of female flowers appearing before the leaves, on short lateral stalks. (*Smith.*) *S.* Doniàna, in the female, which is the only sex at present known to British botanists, assimilates to the kinds of the group Purpùreæ, except *S.* rùbra *Huds.*, in the aspect of the branches, shoots, leaves, and catkins; in some of the leaves being opposite; and in the old bark being internally yellow, though less remarkably so than that of these kinds; but it differs from them in having its leaves silky beneath, and its ovary stalked, and Mr. Borrer believes that, in the relation of affinity, it is nearest to *S.* fùsca; but he notices that we are without the means of proof, which the male flowers would afford. There are plants at Woburn Abbey, Henfield, and Flitwick House, and in the Goldworth Arboretum.



1322

Group xii. *Ambíguæ* Borrer.

Shrubs.



S. finmárchica *Willd.* has been added to kinds included in this group by Mr. Borrer.

⁎ ■ 54. *S.* AMBI'GUA *Ehrh.*, *Borrer*. The ambiguous Willow.

Identification. Borrer in Eng. Bot. Suppl., t. 2733., who has adduced there the following references:— "Ehrh.; Willd. Sp. Pl., 4. p. 700.; Hook. Br. Fl., ed. 2., p. 418.; Koch Comm., p. 49.; Bluff. et Fing. Fl. Germ., 2. 561."

Synonymes. Some are cited under the varieties treated of below; *S.* ambigua *Koch*, part of, *Koch Comm.*, p. 49.

The Sexes. Both sexes of var. α, the female of var. β, the male of var. γ, and the female of var. δ, are figured in *Eng. Bot. Suppl.*

Engraving. Engl. Bot. Suppl., t. 2733.

Spec. Char., &c. Leaves oval, obovate, or lanceolate, slightly toothed, and having a recurved point; pubescent, somewhat rugose above, glaucous and having prominent veins beneath. Stipules half-ovate, acute. Catkins stalked, upright, cylindrical. Ovary stalked, densely silky. Style very short. Stigmas short, at length cloven. (*Borr.* in *Bot. Suppl.*) Indigenous on gravelly heaths, in Sussex, Essex, and Suffolk; and has been observed in Perthshire, Angusshire, Caithness, Orkney,

and the Hebrides. (*Borrer.*) *S.* ambígua approaches, on the one side, to *S.* aurita, with the smallest varieties of which it is most liable to be confounded; and, on the other, to *S.* fúsca; differing from the former by its less rugose and less vaulted leaves, and in their distinct serrature, more delicate texture, and less woolly pubescense; also in its smaller, flatter, and less oblique stipules; and from the latter, by its less silvery pubescence, in the more uneven upper surface of its leaves, and their more prominent veins beneath, as well as in some minute characters in the flowers. Koch regards it as a hybrid between the two. It varies much in the procumbent, ascending, or more erect manner of its growth, in the paler or darker brown tinge of the twigs, and in the quantity of pubescence. (*Borrer.*)

Varieties.

★ ⬬ S. *a.* 1 *vulgàris*; *S.* a. *α Borr.* in *Eng. Bot. Suppl.*, t. 2733., 5 figures of the two sexes, and description. — A small straggling shrub, with branches sometimes procumbent, sometimes rising 1 ft. or 2 ft. from the ground. (*Borrer.*) A very full description, and 5 figures, are given in *Eng. Bot. Suppl.* There are plants at Henfield.

⬬ S. *a.* 2 *màjor*; *S.* a. *β* màjor *Borrer* in *Eng. Bot. Suppl.*, t. 2733., 3 figures of the female, and description; ? *S.* ambigua *β Hook. Br. Fl.*, ed. 2., p. 418.; *S.* versifòlia *Sering. Saules de la Suisse*, No. 65., *Monogr*, 40. (*Borrer.*) — Mr. Borrer mentions the three following forms of this variety :— 1. A plant found on heathy ground, at Hopton, Suffolk, which attains, in the garden, the height of 5 ft., and scarcely differs from *S.* ambígua vulgàris, except in growing erect, and in the greater size of all its parts. It is much less silky than the following kind. 2. This, *S.* ambígua *β Hook. Br. Fl.*, has a silvery appearance, from the abundance of silky hairs which clothe the leaves, especially beneath. It is said by Mr. Drummond, who found it on bogs, near Forfar, to be of upright growth, and 3 ft. or 4 ft. high. 3. *S.* versifòlia of Seringe appears, from his specimens, to belong to this variety; but whether *S.* versifòlia of Wahlenberg is, as Seringe thought, notwithstanding the long style, and some other discrepancies, the same, we have no means of deciding. Koch thinks it rather, according to Wahlenberg's original idea, a hybrid offspring of *S.* myrtillöides, and *S.* limòsa of Wahlenberg, the *S.* arenària *L.* (*Borrer.*) There are plants at Henfield.

⬬ S. *a.* 3 *spathulàta*; *S.* a. *γ* spathulàta *Bor.* in *Eng. Bot. Suppl.*, t. 2733., where three specimens of the male plant are figured and described; *S.* ambígua *γ Hook. Br. Fl.*, ed. 2., p. 418.; *S.* spathulàta *Willd. Sp. Pl.*, 4. 700.; *Bluff. et Fing. Fl. Germ.*, 4. 566. (*Borrer*); *S.* spathulàta *Willd.*; scarcely differs from *S.* ambigua vulgàris, except in the narrower base of the leaf. The style has been supposed to be longer; but that organ seems to vary a little in length, in both *S.* vulgàris and *S.* a. màjor, from accidental circumstances. (*Borrer.*) *S.* spathulàta *Willd.* is indigenous to Germany; and, according to Mr. Borrer's identification of a kind found wild in England, to Epping Forest, Essex. There are plants at Henfield.

⬬ S. *a.* 4 *undulàta*; *S.* a. *δ* undulàta *Borrer* in *Eng. Bot.*, t. 2733., 4 figures of the female, and description; *S.* spathulàta *Willd.*, var. undulàta of Professor Mertens. (*Borrer.*)—This variety occurs at Hopton in Suffolk, as well as *S.* a. màjor. It is remarkable for its lanceolate or almost linear leaves, and distinctly stalked stipules. "In our specimens of this, both the style and the stalk of the germen are occasionally longer than in the other varieties." (*Borrer.*)

? ★ ? ⬬ 55. *S.* FINMA'RCHICA *Willd.* The Finmark Willow.

Identification. Willd. Enum. Suppl., p. 66.; Ber Baum., p. 441.; Koch Comm., p. 51.
The Sexes. The female is noticed in the specific character.

Spec. Char., &c. Leaves elliptic, obovate, or lanceolate, the tip recurved; entire, or toothed with distant glanded teeth; beneath, wrinkled with veins, downy; afterwards more or less glabrous. Stipules half-ovate, straight. Catkins of female flowers peduncled; the peduncle a leafy twig. Capsule ovate-lanceolate, glabrous, upon a stalk that is four times longer than the gland. Style short. Stigmas ovate, notched. (*Koch.*) Wild in moist meadows, and on mountains clothed with pines, in Podolia and Volhynia; and, perhaps, wild in Finmark. Very like *S.* ambígua *Ehrh.*, from which it differs only in its glabrousness, and in the peduncles of the catkins being longer, and furnished with more perfectly developed leaves. (*Id.*) Introduced in 1825. There are plants in the Hackney arboretum.

★ ? ⬬ 56. *S.* VERSI'COLOR *Forbes.* The various-coloured Willow.

Identification. Forbes in Sal. Wob., No. 77.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 77.; and our *fig.* 77. in p 1618.

Spec. Char., &c. Leaves elliptic, almost entire; greyish green and villous above, glaucous and pubescent beneath. Stipules large, ovate. Ovary ovate, stalked, silky. Style smooth. Stigmas divided. (*Sal. Wob.*, p. 153.) A native of Switzerland; when introduced is uncertain (? 1824); flowering, in the willow garden, in May. A low, depressed, or trailing shrub, about 2 ft. high, with slender, round, pubescent branches; the young ones greenish brown, densely downy; much resembling those of *S.* *a*laternöides, but always depressed; while those of *S.* *a*laternöides are quite erect. Leaves about 1½ in. long, nearly 1 in. in breadth, elliptic, with bluntish points; green and villous above; glaucous, pubescent, and whitish beneath; margins

distantly marked with 3 or 4 minute teeth, entire towards the base. Footstalks short, rather slender, downy; midrib and veins prominent. Stipules on short footstalks, ovate, sloping off at one side. Catkins numerous, recurved, above ½ in. in length.

■ 57. *S.* ALATERNOÏ'DES *Forbes.* The Alaternus-like Willow.

Identification. Forbes in Sal. Wob., No. 76.
The Sexes. The female is described and figured in *Sal. Wob.* "I have not met with a male plant." (*Forbes.*)
Engravings. Sal. Wob., No. 76.; and our *fig.* 76. in p. 1618.

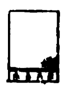
Spec. Char., &c. Leaves elliptic-lanceolate, entire, pointed; villous above, hairy and white beneath. Stipules ovate, serrated. Catkins 1 in. long, thick, and obtuse. Ovary ovate, subulate, silky, stalked. Style shorter than the linear undivided stigmas. (*Sal. Wob.*, p. 151.) A native of Switzerland. Introduced in 1824, and flowering in April and May. A low, upright, bushy shrub, growing, in the Woburn collection, to the height of 5 ft. or 6 ft., with slender, round, pubescent, reddish branches, dark green after the first year. Leaves from 1 in. to 1½ in. long, or perhaps more; about ½ in. in breadth; elliptic-lanceolate, or somewhat obovate, pointed, entire, dull green and villous above, whitish and densely hairy beneath; reticulated, with a pale midrib. Catkins 1 in. long, appearing before the leaves. There are plants at Woburn Abbey and in the Hackney arboretum.

■ ? ‡ 58. *S.* PROTEÆFO'LIA Schl. The Protea-leaved Willow.

Identification. Schleicher, quoted in Hook. Br. Fl., ed. 2., p. 419.; Forbes in Sal. Wob., No. 75.
Synonymes. Erroneously referred to *S.* ambigua in *Hook. Br. Fl.*, ed 2. (*Borrer MSS.*)
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 75.; and our *fig.* 75. in p. 1617.

Spec. Char., &c. Leaves elliptical, entire; villous above, white and silky beneath. Stipules ovate, silky. Catkins thick, obtuse. Ovary stalked, ovate, silky. Bractea obovate, silky. Stigmas undivided. (*Sal. Wob.*, p. 149.) A native of Switzerland. Introduced in 1820; flowering in April and May. This is a handsome upright-growing shrub, or low tree, attaining the height of 12 ft., although only four years planted. Branches of a brownish green fuscous colour, somewhat downy, but ultimately becoming smooth; the young twigs are of a yellow purple, pubescent, and soft to the touch. Leaves elliptic, about 1½ in. long; dull green and villous above, whitish and silky beneath, and reticulated with large prominent veins; the young leaves have rather a silky silvery appearance; while the old ones become more firm and pubescent, their margins entire, or sometimes very distinctly marked with shallow serratures. Catkins about 1 in. long. A very ornamental plant, but not fit for cultivation for economical purposes. There are plants at Woburn Abbey, Henfield, and Flitwick House, and also in the Goldworth Arboretum.

Group xiii. *Reticulàtæ* Borrer.



The characteristics of this group, as adopted in *Hook. Br. Fl.*, are not described; because it consists of only one species, the *S.* reticulàta *L.*, and the characteristics of this species may be deemed representative of those of the group.

⁂ 59. *S.* RETICULA'TA *L.* The netted, *or wrinkled, leaved,* Willow.

Identification. Lin. Sp. Pl., 1446.; Willd. Sp. Pl., 4. p. 685.; Smith in Rees's Cyclo., No. 75.; Koch Comm., p. 62.; Du Ham. Arb., ed. 1., 3. p. 132.; Smith Eng. Bot., t. 1908.; Eng. Fl., 4. p. 200.; Forbes in Sal. Wob., No. 67.; Hook. Br. Fl., ed. 2., p. 419.; Hayne Abbild., p. 236.; Host Sal. Aust., 1. p. 33.; Pursh Fl. Amer. Sept., 2. p. 610.
The Sexes. Both sexes are figured in *Eng. Bot.*, and *Sal. Wob.*, *Host Sal. Aust.*, and *Hayne Abbil.* It may be inferred that both are not difficultly obtainable in the wild localities of the species.
Engravings. Lin. Fl. Lapp., ed. 2., t. 3. f. 1., t. 7. f. 1, 2.; Fl. Dan., t. 212.; Hoffm. Sal., 2—3., t. 25—27.; Du Ham. Arb., ed. 1, 3. t. 32.; Eng. Bot., t. 1908.; Sal. Wob., No. 67.; Hayne Abbild., t. 178.; Host Sal. Austr., 1. t. 105.; our *fig.* 1323.; and *fig.* 67. in p. 1616.

Spec. Char., &c. Leaves orbicular, somewhat elliptical, obtuse, entire, coriaceous, with reticulated veins, nearly glabrous; glaucous beneath. Ovary sessile, downy. (*Smith E. F.*) The young foliage is often floccose. (*Br. Fl.*, ed. 2.) A native of England, and the high mountains in Wales and Scotland; flowering from May to July. Koch has stated its European places of growth to be as follows: — Moist rocks, or other moist places, of the highest mountains above the limit of perpetual snow, in Piedmont, Savoy, Switzerland, the Pyrenees, Germany, Carpathia, Transylvania, Britain, and Lapland. Hooker has remarked (*Br. Fl.*, ed. 2.) that he possesses *S.* reticulàta, obtained from Arctic America, and having long silky hairs on both surfaces of the leaf. Mackay has not inserted the species in the *Flora Hibernica*. Lightfoot, as quoted by Smith, has noted the kind of soil in which it occurs on many of the Scottish highland mountains to be micaceous. "Larger than *S.* herbàcea, with stout, woody, procumbent stems and branches, either mantling the alpine rocks, or spreading on the ground in large patches. Leaves 3 from each bud, on long slender footstalks, without stipules; alternate, nearly orbicular, or somewhat elliptical, 1 in. broad, firm, coriaceous though deciduous, entire, with an occasional notch at the end; the upper surface wrinkled, of a deep shining green; the under surface very glaucous or whitish, beautifully reticulated with abundance of prominent veins, now and then somewhat silky. Catkins solitary at the end of the same branch, above the leaves;" of a purplish red colour, as are the buds. The veins on the under surface of the leaf are of a purplish colour. (*Linnæus.*) This is a most remarkable species, totally different from any other; and it ought not to be wanting in any collection. Smith has deemed it akin to *S.* herbàcea. Koch has associated the two in the same group. In its rounded wrinkled leaves, villous when young, in its buds, and in its branches, it bears much similarity to *S.* càprea, though it is widely different in its inflorescence. There are plants in the arboretum of Messrs. Loddiges, in the Fulham Nursery, and in the Goldworth Arboretum.



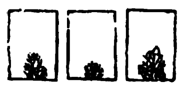
1323

App. i. *Reticulàtæ described, but not yet introduced.*

S. *vestita* Pursh Fl. Amer. Sept., 2. p. 610., Smith in Rees's Cyclo., No. 76., differs from *S.* reticulàta, in having the under side of its leaves clothed with long silky hairs. Pursh calls it a very elegant species. It is a native of Labrador.

Group xiv. *Glaúcæ* Borrer.

Small, upright, with soft silky Leaves.



Stamens 2 to a flower. Ovary very downy, or silky, sessile. Plants small shrubs, most of them upright; all, or most of them, remarkable for their foliage, which consists of leaves that are oblong-lanceolate, soft, hairy, silky, and, in most, white and cottony on the under surface. The kinds are very closely akin, each among the rest. (*Hook. Br. Fl.*, ed. 2., adapted.) Only *S.* glaúca *L.*, *S.* arenària *L.*, and *S.* Stuart*iàna* Smith, are associated together under the above characteristics in *Hook. Br. Fl.*, ed. 2. Of the kinds brought together below, as agreeing more or less in the quality of similarity, Mr. Borrer has indicated *S.* elæagnifòlia *Forbes* (elæagnöìdes *Schleicher*), *S.* glaúca *L.*, *S.* serícea *Villars*, *S.* Lappònum *L.*, *S.* arenària *L.*, *S.* arenària *L.* ? var., *S.* leucophýlla *Schleicher;* and *S.* Stuart*iàna* Smith.

■ 60. *S.* ELÆAGNÖÌ`DES *Schleicher*. The Elæagnus-like Willow.

Identification. Schleich. Cat.; Seringe Sal. Helv., p. 91.; both quoted by Koch in Comm., p. 56.

Synonymes. S. elæagnifòlia *Forbes* in *Sal. Wob.*, No. 69., where the name is quoted as one adopted by M. Schleicher; *S.* glaùca var., with leaves lanceolate, more narrow and more acute, and with flowers in the catkin a little more laxly disposed. (*Koch De Sal. Europ. Comm.*)
The Sexes. The female is described and figured in *Sal. Wob.*; but the male is neither mentioned there, nor by Koch.
Engravings. Sal. Wob., No. 69.; and *fig.* 69. in p. 1616.

Spec. Char., &c. Leaves entire, ovate-elliptic, nearly glabrous above, woolly and white beneath. Catkins cylindrical. Ovary nearly sessile, ovate, downy. Style elongated. Stigmas bifid. (*Forbes* in *S. W.*) A native of Europe. Introduced in 1824; flowering in May, and, in the willow garden at Woburn Abbey, in April, and again in August. This is an upright-growing shrub, attaining the height of 6 ft.; the leaves and branches much resembling those of *S.* glaùca, but distinct; the leaves being of a thinner texture, with a different direction of their finer veins. The leaves are of an ovate-elliptic shape, nearly glabrous on their upper surface, white and woolly underneath. Catkins of the female 2 in. long, and cylindrical.

✱ 61. *S.* GLAU'CA *L.* The glaucous *Mountain* Willow.

Identification. Lin. Sp. Pl., 1446.; Fl. Lapp., ed. 2., 299. t. 8. f. *p*, t. 7. f. 5.; but it is not *S.* serícea of Villars (*Smith*.); Wahlenb. Fl. Lapp., 264. t. 16. f. 3.; Willd. Sp. Pl., 4. p. 687.; Smith in Rees's Cyclo., No. 84.; Koch Comm., p. 55.; Smith Eng. Bot., t. 1810.; Eng. Flora, 4. p. 201.; Forbes in Sal. Wob., No. 68.; Hook. Br. Fl., ed. 2., p. 419.
Synonyme. S. appendiculàta *Fl. Dan.*, t. 1056., *Willd. Sp. Pl.*, 4. p. 690., *Smith* in *Rees's Cyclo.*, No. 93.
The Sexes. Both sexes are described in *Eng. Fl.*; the female is figured in *Eng. Bot.*, and in *Sal. Wob.*
Engravings. Lin. Fl. Lapp., ed. 2., t. 8. *f. p*, t. 7. f. 5.; Wahl. Fl. Lapp., t. 16. f. 3.; Eng. Bot., t. 1810.; Sal. Wob., No. 68.; Hall. Hist., 2. t. 14. f. 2.; our *fig.* 1324.; and *fig.* 68. in p. 1616.

Spec. Char., &c. Leaves nearly entire, elliptic-lanceolate; even, and nearly glabrous above; woolly and snowy-white beneath. Footstalks decurrent. Ovary sessile, ovate, woolly. (*Smith E. F.*) A native of the Highlands of Scotland; flowering there in July, but, in the willow garden at Woburn Abbey, in May. Described by Smith as having a stem 2 ft. to 3 ft. high, stout, bushy, with numerous short, round, spreading, brown or yellowish branches, downy in their early state. Leaves nearly 2 in. long, and ½ in. or ¾ in. wide; elliptic-lanceolate, acute, somewhat rounded at the base; nearly, if not in every part, quite entire; the upper side of a beautiful glaucous green, the under one densely downy or cottony, of no less elegant and pure a white, with slightly prominent veins, and a reddish midrib. In the willow garden at Woburn Abbey the plant is 18 in. high; there are plants also at Henfield.



1324

✱ 62. *S.* SERI'CEA *Villars.* The silky Willow.

Identification. Villars Delph., 3. p. 782. t. 51. f. 27.; Willd. Sp. Pl., 4. p. 688.
Synonyme. S. glaùca, a synonyme of *Koch Comm.*, p. 56. "*S.* serícea of Villars, according to his own specimens, is the true Lappònum; and I have Swiss ones, properly so named, from M. Schleicher. It is Haller's No. 1643." (*Smith* in *Engl. Fl.*, 4. p. 202.)
The Sexes. Willdenow has described the female, and noted that he had seen it in a dried state.
Engravings. Vill. Delph., 3. t. 51. f. 27.; and *fig.* 74. in p. 1617.

Spec. Char., &c. Stem prostrate. Leaf oblong-lanceolate, entire, obtuse, silky and hoary on both surfaces. Catkins silky, stout. Capsules ovate-oblong, stout, very villous, sessile. Very different from *S.* glaùca *L.* (*Willd.*, *Villars* in *Willd. Sp. Pl.*) Branches brown, glossy. Leaves 2 in. long, covered with long appressed hairs. Stipules are not apparent. Catkins ½ in. long, cylindrical. Bracteas lanceolate, hairy, caducous. Style short, bifid. Stigmas dilated, bifid. Wild in the Alps of Switzerland and France. (*Id.*) Introduced in 1820. Mr. Forbes has a kind under the name *S.* serícea, but has quoted Willdenow in identification, with a mark of doubt. The following matter is taken from Mr. Forbes's account. Leaves oblong-lanceolate, very entire, both sides silky, glaucous beneath. Ovary ovate, villous, nearly sessile. Style deeply divided. Stigmas parted. (*Sal. Wob.*, p. 147.) A native of Switzerland. Introduced in 1820, and flowering,

in the willow garden at Woburn Abbey, in April and May. This species grows to the height of 5 ft. or 6 ft.; quite erect, with dark green, rounded, pubescent branches; the old ones shining and glabrous after the first year. Leaves from 2 in. to nearly 3 in. or 3½ in. long, and from 1 in. to 1½ in. broad; densely silky on both sides, elliptic-lanceolate, with acute oblique points; the lower rather obtuse; margins entire; whitish and glaucous beneath; closely covered with long, compressed, silky hairs. Midrib prominent, yellow. Footstalks yellow, pubescent, very stout, and much dilated at the base. Catkins 1 in. or more in length, appearing before the expansion of the leaves. They remain on the plant during the greater part of the summer; by which peculiarity this very distinct species is readily known from every other. The female plant is figured and described in the *Salictum Woburnense*.

* 63. *S.* Lappo'num *L.* The Laplanders' Willow.

Identification. Lin. Sp. Pl., 1447.; Fl. Lapp., 366. t. 8. f. *t*, ed. 2., 300. t. 8. *f. t*; Willd. Sp. Pl., 4. p. 689.; Smith in Rees's Cyclo., No. 89., but the syn. *S. sericea Villars*, there applied to *S.* Lappònum, Koch has applied to *S.* glaúca; Forbes in Sal. Wob., No. 73.
Synonyme. S. arenària *Fl. Dan.*, t. 197. (*Smith.*)
The Sexes. The female is described in *Willd. Sp. Pl.*, and described and figured in *Sal. Wob.*
Engravings. Lin. Fl. Lapp., t. 8. f. *t*, ed. 2., t. 8. f. *t*; Sal. Wob., No. 73.; our *fig.* 1325.; and *fig.* 73. in p. 1617.

Spec. Char., &c. Leaves lanceolate, very entire, bluntish; hoary above, woolly beneath. Seed-vessels woolly and oblong. (*Forbes S. W.*) A native of Lapland; flowering there in May and June, and, in the Woburn collection, in April. Introduced in 1812. "This appears to be a very distinct species from glaúca, elæagnifòlia, arenària, lanàta, and Stuartiàna. It grows with me to about 1 ft. high, with short, pale, decumbent branches; sometimes the young twigs are tinged, with red. Leaves from 1 in. to 1½ in. long, often unequal at the base, densely downy on both surfaces, and white beneath. Catkins from 1 in. to 1½ in. long." (*Forbes.*) Smith has incidentally noted in *Eng. Fl.*, iv. p. 202., the following characters of *S.* Lappònum *L.*: — "Leaves 2 in. to 2½ in. long, greyish, all over very silky, both sides alike at every period of their growth, and never cottony. Catkins large, with large floral leaves, like the proper leaves. Bracteas oblong, hairy. Ovary and capsule sessile, peculiarly woolly." It grows wild in the alps of Lapland, everywhere. (*Willd.*)



1325

64. *S.* obtusifo'lia *Willd.* The blunt-leaved Willow.

Identification. Willd. Sp. Pl., 4. p. 705.; Smith in Rees's Cyclo., No. 131.

Spec. Char., &c. Leaves oblong-lanceolate, wedge-shaped at the base, finely villous on both surfaces, glaucous on the under one; the upper leaves acute and entire; the lower bluntish and distantly toothed. Frequent in the woods and on the mountains of Lapland. (*Lin.* and *Smith.*) A slender shrub, not unfrequently arborescent. Young branches clothed with long silky down. Leaves rather more than 2 in. long, and ¾ in. wide. It is remarkable that, contrary to the nature of most willows, the lower blunter leaves of each branch are furnished with minute distant teeth; while the upper and pointed ones are quite entire. Except in the teeth of the leaves, it comes nearer to *S.* Lappònum than any other. (*Smith.*) Introduced in 1818.

65. *S.* arena'ria *L.* The sand Willow.

Identification. Lin. Sp. Pl., 1447.; Lin. Fl. Lapp., ed. 2., 298. t. 8. *f. o, q*; Willd. Sp. Pl., 4. p. 689., exclusively of the synonymes; Hayne Abbild., p. 236.; Fl. Dan., t. 197., and Hall., No. 1642.; Smith in Rees's Cyclo., No. 90.; Smith Eng. Bot., t. 1809;, Eng. Fl., 4. 204.; Forbes in Sal. Wob., No. 70.; Hook. Br. Fl., ed. 3., p. 426.
Synonyme. S. limòsa *Wahlenb. Fl. Lapp.*, 265., *Koch Comm.*, p. 54.
The Sexes. Both are described in *Eng. Flora*, and both are figured in *Sal. Wob.*: the male is figured in *Eng. Bot.*
Engravings. Lin. Fl. Lapp., ed. 2., t. 8. *f. o, q*; Gmel. Sib., 1. t. 36. *f.* 1.; Wahlenb. Fl. Lapp., t. 16. *f.* 4.; Hayne Abbild., t. 179.; Eng. Bot., t. 1809.; Sal. Wob., No. 70.; and *fig.* 70. in p. 1617.

Spec. Char., &c. Leaves nearly entire, ovate, acute; reticulated and somewhat downy above; veiny and densely woolly beneath. Style as long as the sessile woolly ovary. Stigmas linear, deeply divided, the length of the style. (*Smith E. F.*) A native of the Highland mountains, especially those of Breadalbane and Clova; flowering there in June, but, in the willow garden at Woburn Abbey, in May. A larger and stouter shrub than *S.* glaúca, of which it was supposed by the original finder to be the female plant; but

barren as well as fertile individuals, of both species, agreeing exactly together in other respects, and differing alike from correlative ones of the other species, are now well known. In size and general habit, this most resembles *S.* glaúca; but their discriminative marks are clearly discernible. The leaves of *S.* arenària are rather smaller and shorter, more precisely ovate, with a little sharp point; their upper surface dark green, reticulated with sunk veins, and clothed with thin cottony down, more dense and soft upon the young ones; the under side pure white, with dense cottony wool; the veins prominent; midrib reddish; the young leaves, as well as the floral ones, beautifully silky beneath. (*Id.*) Mr. Forbes states that he has plants of this willow with leaves not above half the size of those of others, owing to their being planted in a different soil; which will show, he says, "how much culture improves the size of these species of plants."

? Variety.

■ S. *a.* ? *leucophýlla*; *S.* leucophýlla *Schleicher*. (*Borrer* in a letter.) — Koch has cited *S.* leucophýlla *Willd. Enum. Suppl.*, p. 66., *Berl. Baumz.*, p. 444. t. 6. f. 3., as a state of *S.* limòsa *Wahlenb.*, distinguished by having the under surface of the leaves less snowily tomentose: perhaps this is the same as Schleicher's.

⁎ 66. *S.* OBOVA'TA *Pursh.* The obovate-*leaved*, *or Labrador*, Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 611.; Smith in Rees's Cyclo., No. 91.; Forbes in Sal. Wob., No. 144.
The Sexes. The male is noticed in the specific character.
Engravings. Sal. Wob., No. 144., a leaf; and *fig.* 144. in p. 1630.

Spec. Char., &c. Stem diffuse. Leaves obovate, obtuse, entire; glabrous above, clothed with silky hairs beneath. Stipules none. Catkins sessile. Bracteas obovate, black and hairy at the end. Native to Labrador, and to the north-western coast of America. Flowering in May. Allied to *S.* arenària *L.*, and somewhat inclined to be upright. Stamens two. (*Pursh.*) Whether introduced, or not, is uncertain.

? ⁎ ? ■ 67. *S.* CANE'SCENS *Willd.* The greyish Willow.

Identification. Willd. Sp. Pl., 4. p. 687.; ? Enum.; Smith in Rees's Cyclo., No. 86.
Synonyme. *S.* limòsa *Wahlenb.* var., *Koch Comm.*, p. 55.
The Sexes. The female is noticed in Willdenow's description.

Spec. Char., &c. Leaves oblong-lanceolate, acute, slightly serrated in the middle part; glabrous and glossy on the upper surface, white and tomentose on the under one. Capsules ovate, tomentose. (*Willd.*) Willdenow describes it more particularly from a female dried specimen, as follows: — Branches brown, rather downy when young. Leaves 2 in. to 3 in. long when young; canescent on the upper surface. Stipules not apparent. Catkin of the female cylindrical, 1 in. long. Capsule sessile. Native country not known with certainty; though in Sweet's *Hort. Brit.*, ed. 1830, *S.* canéscens *Willd. Enum.* is stated to be a native of Germany, introduced into Britain in 1815.

■ 68. *S.* STUARTIA'NA Smith. Stuart's, *or the small-leaved shaggy*, Willow.

Identification. Smith Eng. Bot., t. 2586.; Smith in Rees's Cyclo., No. 84.; Eng. Fl., 4. p 203.; Forbes in Sal. Wob., No. 72.; Hook. Br Fl., ed. 2., p. 419.
Synonymes. *S.* arenària masculina *Smith Fl. Brit.*, p. 1059., *Eng. Bot.*, t. 1809. the text; *S.* Lappònum *Walker*; *S.* limòsa *Wahl.* var. fòliis angustióribus lanceolàtis *Koch Comm.*, p. 55.
Derivation. *S.* Stuartiàna "was named in compliment to one of the best men, and most learned scholars, that Scotland has produced, the late Rev. Dr. Stuart of Luss." (*Hook. Br. Fl.*, ed. 2., 1831.)
The Sexes. Both sexes are described in *Eng. Flora*: the female is figured in *Eng. Bot.*, and in *Sal. Wob.*
Engravings. Eng. Bot., t. 2586.; Sal. Wob., No. 72.; and *fig.* 72. in p. 1617.

Spec. Char., &c. Leaves nearly entire, ovate-lanceolate, acute; shaggy above, densely silky, somewhat cottony, beneath. Style as long as the almost sessile woolly germen. Stigmas capillary, deeply divided, the length of the style. (*Smith E. F.*) A native of Scotland, on the Breadalbane Mountains; where it flowers in June, and, in gardens, in July and August. Bushy, and copiously branched; 2 ft. or 3 ft., or rather more, in height. The branches dark brown; downy when young, and leafy, cottony or silky at the tops. Leaves scarcely half the size of those of *S.* glaúca and *S.* arenària, and more lanceolate; rarely somewhat obovate, sharp-pointed; sometimes slightly wavy or toothed; the upper surface greyish green, shaggy or silky, partly denudated by culture, always very even, not wrinkled or veiny; the under

side white, and more densely silky, partly cottony. (*Smith.*) There are plants at Woburn, Henfield, and Flitwick.

Variety. Mr. Forbes has noted that he was in possession of a variety corresponding with *S.* Lappònum in the catkins exactly, but differing from it in the branches and leaves; and that he had received it from Mr. M'Nab of Edinburgh. (*Sal. Wob.*, No. 72.)

✻ 69. *S.* PYRENA'ICA *Gouan.* The Pyrenean Willow.

Identification. Gouan Illustr., 77., exclusively of the synonymes; Willd. Sp. Pl., 4. p. 696.; Smith in Rees's Cyclo., No. 107.; Koch Comm., p. 56.
The Sexes. The female is described in the specific character.

Spec. Char., &c. Leaves elliptic or ovate, acute, entire; when young, tomentosely villous; when adult, glabrous, ciliate, of the same colour on both surfaces, reticulately veined. Catkins peduncled; the peduncle a leafy twiglet. Capsules ovate-lanceolate, tomentose, upon a short stalk, which is longer than the gland. Style bifid. Stigmas elongated, bifid. A native of the Pyrenees, contiguously to the region of snow. (*Koch.*) Introduced in 1823.

Variety or Variation.
✻ S. *p.* 2 *ciliàta*; S. ciliàta *Dec. Fl. Fr.*, 3. p. 293.; *S.* pyrenàica β ciliàta *Dec. Fl. Fr.*, 5. p. 344. (*Koch Comm.*), differs from the species in having no hairs on the surface of the leaves, and only hairs remaining at the edges.

■ 70. *S.* WALDSTEINIA'NA Willd. Waldstein's Willow.

Identification. Willd. Sp. Pl., 4. p. 679.; Koch Comm., p. 57.
The Sexes. The female is noticed in the specific character.

Spec. Char., &c. Leaves elliptic or lanceolate, acute, glabrous, serrated with distant adpressed teeth. Catkins upon a long leafy peduncle, which is a twiglet. Capsules ovate-conical, tomentose, sessile at first, eventually having a short stalk. Gland reaching higher than the base of the capsule. Style elongated, cleft half-way down. Stigmas bifid. Wild on the Alps of Carinthia, the Tyrol, and Salzburg. (*Koch.*) Introduced in 1822.

Group xv. *Viminàles* Borrer.

Willows and Osiers.—Mostly Trees, or large Shrubs, withlong pliant Branches, used for Basket-making.



Stamens 2 to a flower. Ovary nearly sessile; in *S.* mollíssima *Ehrh.* sessile; hairy or silky. Style elongated. Stigmas linear, mostly entire. Leaves lanceolate. Plants trees of more or less considerable size, with long pliant branches. (*Hook. Br. Fl.*, ed. 2., adapted.)

■ 71. *S.* SUBALPI'NA *Forbes.* The subalpine Willow.

Identification. Forbes in Sal. Wob., No. 93.
The Sexes. The male is described and figured in *Sal. Wob.* "The female plant I have not seen." (*Forbes.*)
Engravings. Sal. Wob., No. 93.; and *fig.* 93. in p. 1619.

Spec. Char., &c. Leaves elliptic-lanceolate, nearly entire; villous above, white and cottony beneath. Stipules not apparent. Catkins nearly 1 in. long. Bractea reddish. Anthers yellow. (*Sal. Wob.*, p. 185.) A native of Switzerland. Introduced in 1820, and flowering in April and May. A low upright shrub, with round, yellowish, pubescent, slender branches, which soon turn black in drying, the old ones becoming glabrous and brown. Leaves from 2 in. to 2½ in. in length; elliptic-lanceolate, bright green, wrinkled, and pubescent; beneath, somewhat glaucous, whitish, densely pubescent, reticulated with prominent arched veins, their margins slightly revolute; at first seeming entire, but, on minute investigation, appearing furnished with a few distant glandular serratures towards the apex. Barren catkins from ½ in. to 1 in. long. Anthers yellow. The twigs are brittle, and, though rather elongated, Mr. Forbes thinks them unfit for basketwork. Mr. Borrer remarks of this kind, that, perhaps, it is not of the group Viminàles, in which he has placed it. According to a specimen of it which has been sent to us by Mr. Brooks of Flitwick House, it has rounded rather tumid buds, and the shoot is rather angled; and in these characters, and in those of its

leaves, it is dissimilar to *S.* viminàlis : its buds and leaves seem rather to indicate affinity to kinds of the group Cinèreæ. There are plants at Henfield.

■ 72. *S.* CA'NDIDA *Willd.* The whitish Willow.

Identification. Willd. Sp. Pl., 4. p. 708. ; Pursh Fl. Amer. Sept., 2. p. 608. ; Smith in Rees's Cyclo., No. 138. ; Forbes in Sal. Wob., No. 91.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 91. ; our *fig.* 1326. ; and *fig.* 91. in p. 1619.


1326

Spec. Char., &c. Leaves linear-lanceolate, very long, obscurely toothed; downy above; beneath densely downy. Stipules lanceolate, nearly the length of the footstalks. (*Willd.* and *Forbes.*) A native of North America. Introduced in 1811, and flowering, in the willow-garden at Woburn Abbey, about the end of February or beginning of March. Leaves from 3 in. to 4 in. long; linear-lanceolate, narrow towards their extremities, obscurely toothed; margins slightly revolute; downy above, snow-white and cottony beneath; with a prominent midrib, and obscurely prominent lateral veins, owing to the down. Catkin of the male 1 in. long, cylindrical. A very handsome species, well deserving a place in shrubberies, both for its ornamental white leaves, and very early flowers. There are plants at Woburn and Henfield.

Varieties. Mr Forbes mentions two varieties, one of which flowers full three weeks earlier than the other, and has the anthers of a less deep scarlet. (*Sal. Wob.*)

■ ? ♀ 73. *S.* INCA'NA *Schranck.* The hoary-*leaved* Willow, ? *or Osier.*

Identification. Schranck Baier (Bavar.) Fl., 1. p. 230. ; Koch Comm., p. 32. ; Forbes in Sal. Wob., No. 90.
Synonymes. *S.* ripària *Willd. Sp. Pl.*, 4. p. 698., *Smith* in *Rees's Cyclo.*, No. 111., *Hayne Abbild.*, p. 245., ? *Host Sal. Austr.*, 1. p. 17. ; *S.* lavandulæfòlia *Lapeyr. Abr.*, p. 601., *Seringe Sal. Helv.*, p. 70. ; *S.* angustifòlia *Poir.* in *Du Ham. Arb.*, ed. 1., 3. t. 29. ; *S.* rosmarinifòlia *Gouan Hort.*, 501., *Schranck Salisb.*, No. 38., *Scop. Carn.*, p. 527., *Host Syn.*, 529. ; *S.* viminàlis *Vill. Delph.*, 3. p. 785.
The Sexes. Both are figured in *Hayne Abbild.* : the male is figured in *Sal. Wob.*, where Mr. Forbes has noticed that he had not seen the catkins of the other sex. If the kind of *Host Sal. Austr.* is identical, both sexes of it are figured in that work.
Engravings. Du Ham. Arb., ed. 1., 3. t. 29. ; Hayne Abbild., t. 187. ; Sal. Wob., No. 90. ; ? Host Sal. Austr., t. 58, 59. ; our *fig.* 1327. ; and *fig.* 90. in p. 1619.

Spec. Char., &c. Leaves linear-lanceolate, denticulated, hoary on the under surface with hoary tomentum. Catkins arched, slender, almost sessile, subtended at the base with small leaves. Capsule ovate-lanceolate, glabrous, stalked; the stalk twice the length of the gland. Style elongated. Stigmas bifid. Bracteas subglabrous, ciliate with short hairs. (*Koch Comm.*) The following description of the kind is taken from Mr. Forbes in *Sal. Wob.* : — "Branches villous, dark brown, whitish when young; long and slender, angulated at the top of the young shoots, and distinctly warted; forming a bush 4 ft. or 5 ft. high. Leaves linear, from 3 in. to 4 in. long; minutely serrated, or, rather, furnished with a few glandular teeth towards the base; margin slightly revolute; upper surface green and villous; beneath, thickly clothed with white cottony down: the young leaves are all revolute and snowy-white. Footstalks bearing at the summit two glands, short and dilated at the base. Catkins appearing before the leaves, barren ones 1 in. long. The leaves of this species, Mr. Forbes observes, bear a strong affinity to those of *S.* viminàlis; while the catkins, branches, and mode of growth are quite different; and that it never rises more than 5 ft. or 6 ft. high." Host has described, in the *Sal. Austr.*, his *S.* ripària as an elegant tree; but he may only mean a plant of tree-like figure, but slender and not of considerable height. Koch states that the species is found in a wild state, in


1327

the lower alpine valleys on the Pyrenees, Cevennes, Alps of Dauphiny, Switzerland, Tyrol, Austria, Carpathia; whence it follows the course of rivers, and inhabits their banks and moist meadows; but it does not grow in Germany, on the Rhine, beyond the limits of Suabia, nor north of the Danube. It descends from the Carpathian Mountains into Hungary and Galicia; but, according to Besser, is not found in Volhynia. Introduced in 1821. It flowers, in the willow garden at Woburn, in April. It is an interesting kind for distinctness of character. There are plants at Woburn, Henfield, and Flitwick; and also in the Hackney arboretum, under the name of *S.* trichocárpa.

■ 74. *S.* LINEA'RIS *Forbes*. The linear-*leaved* Willow.

Identification. Forbes in Sal. Wob., No. 89.
Synonyme. ? *S.* incàna var. lineàris *Borrer*. (*Borrer* in a letter.)
The Sexes. The male is described and figured in *Sal. Wob.* Mr. Forbes has noted that he had not seen catkins of the female.
Engravings. Sal. Wob., 89.; our *fig.* 1328.; and *fig.* 89. in p. 1619.

Spec. Char., &c. Leaves linear, villous; shining above, cottony beneath; margins slightly denticulated. Branches brown. Stipules none. Catkins elliptical, nearly sessile. Bracteas elliptical, yellow, as are also the anthers. (*Sal. Wob.*, p. 177.) Brought from Switzerland by the Hon. Henry Grey Bennett, in 1820; and flowering, in the willow garden at Woburn Abbey, in April. A low bushy shrub, with copious branches, dark brown or purplish in every stage. Leaves from 1½ in. to 2½ in. long, truly linear; the margins slightly serrated; the teeth sometimes furnished with glands; the upper surface green, shining, wrinkled, and besprinkled with fine, minute, adpressed hairs, sometimes scarcely visible; beneath, white and cottony, their margins revolute; leaves frequently opposite and alternate on the same branch. Buds of a bright crimson colour. Footstalks short, reddish. No vestige of stipules is to be perceived in any state of growth. Catkins appearing before the leaves, 1 in. long, and erect in the male plant. Easily known by the rosemary-like appearance of its leaves. In the figure of the stamens in *Sal. Wob.* (see our *fig.* 1328.), the stamens are represented as palpably monadelphous; a case of which not any mention is made in the text there. This kind is striking from the narrowness of its leaves. There are plants at Woburn, Henfield, and Flitwick, and in the Goldworth Arboretum.



1328

■ ♀ 75. *S.* VIMINA'LIS *L.* The twiggy Willow, *or common Osier*.

Identification. Lin. Sp. Pl., 1448.; Willd. Sp. Pl., 4. p. 706.; Hayne Abbild., p. 251.; Koch Comm., p. 29.; Host Sal. Austr., 1. p. 16.; Smith Eng. Bot., t. 1898.; Eng. Fl., 4. p. 228.; Forbes in Sal. Wob., No. 133.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 249.; Pursh Fl. Amer. Sept., 2. p. 608.
Synonyme. *S.* longifòlia *Lam. Fl. Fr.*, 2. 232. (*Koch.*)
The Sexes. Both sexes are figured in *Eng. Bot.*, *Sal. Wob.*, *Hayne Abbild.*, and *Host Sal. Austr.* Both exist in Britain. The male seems less robust and vigorous than the female.
Engravings. Eng. Bot., t. 1898.; Sal. Wob., No. 133.; Hayne Abbild., t. 194.; Host Sal. Austr., t. 54, 55.; our *fig.* 1329.; and *fig.* 133. in p. 1629.

Spec. Char., &c. Leaves linear, inclining to lanceolate, elongated, taper-pointed, entire, wavy; snow-white and silky beneath. Branches straight and slender. Ovary sessile. Style as long as the linear undivided stigmas. (*Smith E. F.*) A native of England, in wet meadows; and flowering in April and May. According to Pursh, it grows in North America, introduced from Europe, on the banks of rivers, and about plantations. The following description of its characters is derived chiefly from the *English Flora*: — Branches straight, erect, wand-like, very long and slender, round, polished; when young, downy with fine silky hairs. Leaves on short footstalks, almost upright, about a span long, and ½ in. wide, being nearly linear, acute,



1329

entire, though slightly wavy at the edges, and somewhat revolute; the upper side green, glabrous, even; under side pure white, with close cottony, or rather silky, down. Stipules linear-lanceolate. Catkins numerous, lateral, sessile, full 1 in. long." (*Smith.*) This species is readily distinguished from others of the section to which it belongs by the white satiny under surface of its leaves. It is held in high estimation for the various kinds of basketwork, bands, &c.; and it is generally employed for such purposes.

Varieties. One has the bark of the branchlets of a testaceous colour (brownish yellow); another dark brown; and the leaves of this variety are of a darker green : but there are many intermediate varieties. (*Koch Comm.*) " There is a variety called the velvet osier, in which no external difference is discernible; but the twigs are said to be more pliant." It is much esteemed as an osier for wickerwork. (*Smith Eng. Fl.*, iv. p. 229.) Perhaps it is right to understand Smith as intending this as a distinct kind from " the true velvet osier," which he has noticed under *S.* Smith*iàna*, and which is mentioned in this work under *S.* holoserícea. In the neighbourhood of Edinburgh, a brown-barked variety, probably the same as that mentioned by Koch, is grown for hoops, under the name of the Dutch willow. It makes shoots 10 ft. or 12 ft. long in one season. Plants are common in the nurseries. Species named *S.* Villarèsii, *S.* purpùrea mas, and *S.* rùbra, sent to us from the arboretum of Messrs. Loddiges, are all the same as *S.* viminàlis.

Culture, &c. There is nothing peculiar in the culture of this species, or its varieties; but, as it is a vigorous grower, those who cultivate it in quantities for basket-making or hoops generally plant it in the best soil, intersected by watercourses, so that the roots may always have that element within their reach. Accounts of the formation, management, and profit attending osier plantations will be found in the *Bath Agricultural Society's Papers*, vol. xvi. p. 129.; *Transactions of the Society of Arts*, vols. 19, 20. 22, 23, and 24.: but, after our general directions for the culture and management of basket and hoop willows (p. 1467.), it is unnecessary here to enter into farther details.

♠ ⚘ 76. *S.* STIPULA'RIS *Smith.* The stipuled, *or auricled-leaved, Osier, or* Willow.

Identification. Smith Fl. Brit., p. 1069.; Willd. Sp. Pl., 4. p. 708.; Koch de Sal. Europ. Comm., p. 29.; Smith Eng. Bot., t. 1214.; Eng. Flora, 4. p. 230.; Hook. Br. Fl., ed. 2., p. 420.; Mackay Fl. Hibern., pt. 1. p. 249.

The Sexes. Both are described in *Eng. Flora*, and both are figured in *Eng. Bot.*, and both in *Sal. Wob.*

Engravings. Eng. Bot., t. 1214.; Sal. Wob., 132.; and *fig.* 132. in p. 1628.

Spec. Char., &c. Leaves lanceolate, pointed, slightly wavy, obscurely crenate; soft and nearly naked above, white and downy beneath. Stipules half-heart-shaped, stalked, very large. Gland cylindrical. Ovary ovate, nearly sessile, as well as the linear undivided stigmas. (*Smith E. F.*) A native of England, in osier holts, hedges, and woods; and flowering in March. " Twigs upright, tall, soft and downy, of a pale reddish brown, brittle, and of little or no use as an osier. Leaves almost upright, numerous, about a span long, sharp-pointed, unequally and slightly crenate, green, even, and soft; though hardly downy above, finely downy and whitish beneath, with a nearly smooth, reddish, or pale midrib, and remarkably downy, or, as it were, fringed, veins. Footstalks stout, ½ in. or ¾ in. long." (*Smith.*) " Allied to *S.* viminàlis in fructification; differing in its larger and coarser leaves, less white beneath; and in their large, very remarkable stipules." (*Hook. Br. Fl.*) " It is not worthy of cultivation for any economical purpose: yet it was sent several times to the late Mr. Sowerby to draw, as the true *S.* viminàlis, the valuable qualities of which every body knows." (*Smith E. F.*) Common in the nurseries.

⚘ 77. *S.* SMITH*IA'NA* Willd. Smith's Willow, *or the silky-leaved Osier.*

Identification. Willd. Enum., 1008.; Smith Eng. Fl., 4. p. 229.; Forbes in Sal. Wob., No. 134., so far as relates to the female; Hook. Br. Fl., ed. 2., p. 420.; Mackay Fl. Hibern., pt. 1. p. 250.

Synonymes. S. mollíssima *Smith Fl. Brit.*, p. 1070., exclusively of the synonymes, *Eng. Bot.*, t. 1509., *Rees's Cyclo.*; *S.* acumináta, with narrower leaves, *Koch Comm.*, p. 31.; *S.* acumináta β *Lindl. Synop.*, p. 233.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1509.; Sal. Wob., No. 134., the female; and our *fig.* 134. in p. 1629.

Spec. Char., &c. Leaves lanceolate, pointed, slightly wavy, minutely toothed; soft and downy above, but the down scarcely visible; whitish and silky beneath. Stipules long, narrow. Catkins ovate. Germen stalked. Style shorter than the linear deeply divided stigmas. (*Smith Eng. Fl.*) "In my specimens the ovaries and bracteas are remarkably shaggy." (*Hook* in *Br. Fl.*, ed. 2.) A native of England, in meadows and osier grounds; common in the woods in the neighbourhood of Woburn; and flowering in March and April. "Branches erect, wand-like, round, long, slender, reddish, leafy, smooth, finely downy and soft when young; brittle, and unfit for basketwork. Leaves on shortish downy footstalks, lanceolate, 3 in. or 4 in. long, tapering to a point; the margin wavy, or slightly crenated, with minute teeth here and there, especially towards the point; the upper side green, delicately soft to the touch, with extremely minute, almost invisible, close, silky down; under side paler, whitish, densely silky, and likewise peculiarly soft; the midrib and slender veins reddish, rather less downy. Catkins appearing before the leaves, numerous, small." (*Smith.*) *S.* Smith*iàna* is without merit in the economical application of its rods. (*Id.*) There are plants at Woburn Abbey, at Henfield, and at the Goldworth Arboretum: also, under the name of *S.* mollíssima, at Messrs. Loddiges's.

† 78. *S.* MOLLI'SSIMA *Ehrh.* The softest-*surfaced* Willow, *or Osier.*

Identification. Ehrh. Beitr., 6. p. 101.; Willd. Sp. Pl., 4. p. 707.; Wahlenb. Fl. Carpat., p. 317.; ? Hayne Abbild., p. 252.; Koch Comm., p. 28.
Synonyme. *S.* pùbera *Koch* apud *Bönninghausen Fl. Monaster.*
The Sexes. The female is described in the specific character. Koch has noted that he had not seen the male.
Engraving. ? Hayne Abbild., t. 195., the female.

Spec. Char., &c. Leaves lanceolate, acuminate, repandly toothed with distant minute teeth; when young, having the under surface finely tomentose. Stipules ovate, acute. Catkins sessile, or upon a short twiglet seeming a peduncle, and bearing small leaves at the base of the catkin. Capsule ovately conical, tomentose, sessile. Gland reaching higher than the base of the ovary. Style elongated. Stigmas linear, bifid, reaching as high as the hairs of the bracteas. (*Koch.*) It is easily distinguished from *S.* viminàlis by the down of the leaves being finer, yellowish, and not shining; the flowers more loosely disposed in the catkin; the bracteas of a yellowish rusty colour, and by their hairs being of a dull white, and of the length of the stigmas. In *S.* viminàlis the leaves are white, and silky beneath; the bracteas of a very dark brown, and have silvery hairs; and the stigmas are undivided, and extend beyond the hairs of the bracteas. *S.* mollíssima grows wild upon banks of rivers, and contiguously to water, in the north of Germany, in Silesia, and in the north of Hungary. (*Koch.*) A native of Germany.

♠ ? † 79. *S.* HOLOSERI'CEA *Hook.*, ? *Willd.* The velvety, *or "soft-shaggy-flowered,"* Willow, *or Osier.*

Identification. Hook. Br. Fl., ed. 2., p. 421.; Bluff and Fing. Fl. Germ., 2. p. 565. (*Hook.*); ? Willd. Sp. Pl., 4. p. 708. (*Hook.*); ? Hayne Abbild., p. 253.; ? Smith in Rees's Cyclo., No. 137.; ? Koch Comm., p. 34.
Synonymes. *S.* Smith*iàna* rugòsa, quoted as a name extant by *Forbes* in *Sal. Wob.*, No. 134.; ? *S.* acumináta, the var. mentioned by Smith in *Eng. Fl.*, 4. p. 228.; *S.* acumináta var. rugòsa *Smith MSS.*, and probably *S.* rùbra of *Walker's Essays*, p. 443. (*Borrer* in a letter.) I believe that the velvet osier is *S.* holosericea *Willd.*
The Sexes. The male is figured in *Sal. Wob.*; the female is described in the *Specific Character*, &c.
Engravings. Hayne Abbild., t. 196. (the sex is the male); Sal. Wob., No. 134., in which the male catkin only is figured.

Spec. Char., &c. Leaves lanceolate, acuminate, serrated; glabrous above; pale, downy, and strongly veined beneath. Catkins cylindrical. Ovaries stalked, densely clothed with silky wool. Stigmas ovate, sessile. Bracteas very shaggy, black. (*Hook. Br. Fl.*) Wild about Lewes, Sussex. Mr. Borrer thinks that this is probably allied to the *S.* holosericea *Willd.*, and distinguishes it from *S.* acumináta *Smith* by its sessile pale-coloured stigmas, and leaves greener and more rugose above, and more strongly veined beneath. (*Ibid.*) *S.* holosericea *Willd.* is noticed by Smith (*Eng. Fl.*, iv. p. 230.), as a native of Germany, not so of Britain. It is recorded in the *Hortus Britannicus*, as introduced into Britain in 1822. Smith has remarked, besides, that he believes a kind of osier, called the velvet osier, to be identical with *S.* holosericea *Willd.*, and that the velvet osier is much valued for

some kinds of wickerwork. There are plants at Henfield, and at Messrs. Loddiges's.

? 80. *S.* MICHELIA'NA Forbes. Michel's Willow.

Identification. Forbes in Sal. Wob., No. 135.
Synonymes. ? *S.* holosericea *Willd.*, 4. p. 708. (*Forbes*); ? *S.* holosericea var. (*Borrer* in a letter.)
The Sexes. The male plant is figured and described in *Sal. Wob.* Mr. Forbes had not seen the flowers of the female.
Engravings. Sal. Wob., t. 135.; and *fig.* 135. in p. 1629.

Spec. Char., &c. Stem erect. Leaves lanceolate, pointed; flat and villous above; greyish, downy, and reticulated beneath. Stipules ovate, acute, serrated. Filaments long, yellowish. Anthers yellow. Bractea elliptical, hairy. (*Sal. Wob.*, p. 269.) Flowering in April. This plant grows to the height of 12 ft. or 15 ft., although it has not been cultivated above four years. The branches of the preceding year are of a dark brownish green colour, and somewhat villous; those of the present year's growth more of a yellowish brown, and densely covered with a fine pubescence. Leaves from 3 in. to 4 in. long, lanceolate or ovate-lanceolate when fully grown; flat, villous, and ultimately shining above; reticulated, greyish, soft and downy beneath; upper leaves denticulated with small glandular teeth, entire towards the base; lower leaves quite entire, gradually smaller. Footstalks about ½ in. long, downy, pale yellow. Catkins of the male copious, nearly sessile, appearing before the expansion of the leaves. Mr. Forbes doubts whether this may not be the *S.* holosericea of Willdenow; but he retains the name of *S.* Micheli*àna*, which he received with the plant from the Horticultural Society's Garden, till he has an opportunity of seeing the catkins of the female, so as to aid him in coming to a decision. There are plants at Woburn.

81. *S.* FERRUGI'NEA *Anderson.* The ferruginous-*leaved Sallow, or* Willow.

Identification. Anderson MS.; Forbes in Sal. Wob., No. 128.; Borrer in Eng. Bot. Suppl., t. 2665.; Hook. Br. Fl., ed. 3., p. 427.
The Sexes. Both sexes are described and figured in *Eng. Bot. Suppl.*: the female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 128.; Eng. Bot. Suppl., t. 2665.; and our *fig.* 128. in p. 1627.

Spec. Char., &c. Leaves lanceolate, having at the edge wavy crenatures and small teeth; hairy with minute hairs on both surfaces, paler on the under one; thin in substance. Stipules small, half-ovate. Bracteas oblong-lanceolate. Ovary silky, stalked. Style about as long as the oblong stigmas. (*Borrer* in *Eng. Bot. Suppl.*) The late Mr. G. Anderson, who distinguished and named the species, discovered it near Carlisle, in 1809; and found it afterwards in Fifeshire and other counties of Scotland; and by the Thames, near Windsor, Reading, &c. The female has been observed, also, near Nuthurst, Sussex. (*Id.*) The following description is taken from that given by Mr. Forbes in *Sal. Wob.*:—' A bushy shrub or low tree; flowering in April, and growing, in the willow garden at Woburn Abbey, to the height of 12 ft. or 14 ft., with shortish, green, fuscous branches, round, downy, and somewhat of a rusty hue when young, especially towards autumn; but of a more pale yellow in an earlier state. Leaves from 2½ in. to 3 in. long; obovate-lanceolate, tapering towards the base, with rather long oblique points; flat, villous, and dark green above; densely silky, reticulated, and greyish beneath; lower leaves entire, scarcely 1 in. long; upper ones finely serrated towards the apex, or rather furnished with distant, minute, glandular teeth, entire towards the base; the rusty hue also visible in the older leaves. Catkins of the female from 1 in. to 1½ in. long, appearing before the leaves." Mr. Forbes deems this a kind of sallow; and its rounded tumid buds show an affinity to the sallows. Mr. Borrer has placed it in the group Viminàles, and is of opinion that it comes nearest to *S.* Smith*iàna*: he adds, of the young leaves, that " the newly expanded leaves of the male are beautifully tinged with brownish purple, which is nearly,

or in general quite, wanting in the female. Their sides, in that stage of growth, are closely rolled back, as is usual in the group to which this species belongs." (*Eng. Bot.*) There are plants at Woburn Abbey, at Henfield, and at Flitwick: at the latter place, one specimen, seven years planted, is 10 ft. high, with a trunk 7 in. in diameter. It is also in the Goldworth Arboretum, and at Messrs. Loddiges's, whence we have had specimens of both sexes.

♀ 82. *S.* ACUMINA'TA *Smith.* The acuminated-*leaved*, *or large-leaved*, *Sallow*, *or* Willow.

Identification. Smith Fl. Brit., p. 1068., excluding the references to Mill. Dict. and Hoffm. Sal. (*Smith* in *Eng. Fl.*); Willd. Sp. Pl., 4. p. 704., excluding the reference to Hoffm. Sal.; ? Hayne Abbild., p. 251.; Koch Comm., p. 30., exclusively of some of the synonymes; Smith Eng. Bot., t. 1484.; Eng. Fl., 4. p. 227.; Forbes in Sal. Wob., No. 131.; Hook. Br. Fl., ed. 2., p. 421.; Mackay Fl. Hibern., pt. 1. p. 250.
Synonyme. S. lanceolàta *Seringe.*
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and in *Sal. Wob.* Koch has described the male, if what he has described belongs to this species.
Engravings. Eng. Bot., t. 1434.; Sal. Wob., No. 131.; ? Hayne Abbild., t. 193.; our *fig.* 1330.; and *fig.* 131. in p. 1628.

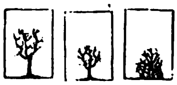
Spec. Char., &c. Stem erect. Leaves lanceolate-oblong, pointed, wavy, finely toothed, glaucous and downy beneath. Stipules half-ovate, then kidney-shaped. Catkins cylindrical. Ovary stalked, ovate, hairy. Style as long as the undivided stigmas. (*Smith E. F.*) A native of England, in wet grounds; flowering in April and May. Neither Mr. Borrer nor Mr. Forbes has ever found this species wild. (*Hook. Br. Fl.*, ed. 2.) Localities in Ireland for it are stated in Mackay's *Flora Hibernica.* Smith and Forbes place this kind among the true sallows. (*Ibid.*) In its upright mode of growth, in the shape of its leaves, and in its general habit, it agrees much better with *S.* viminàlis, *S.* stipulàris, and *S.* Smith*iàna* than with any of the sallow tribe. At Florence Court, where I collected specimens in the autumn of 1833, it has become a tree of about 20 ft. high, although growing in an elevated situation. (*Mackay* in *Flora Hibern.*) The following description is derived from *Eng. Fl.* and *Sal. Wob.*, chiefly from the former: — Generally of more humble growth than the *S.* càprea; though sometimes becoming a lofty tree, with upright, or less spreading, branches, which are always minutely downy, and very soft to the touch. Leaves of a totally different shape, commonly 3 in. or 4 in. long, and 1 in. at least in breadth; elliptic-lanceolate, tapering to an acute point, either flat or somewhat rugged, with copious, though shallow and unequal, marginal notches; the upper side green and smooth, except the midrib; under side paler, and, in a young state, glaucous; delicately soft and downy, with a prominent reddish midrib and veins. Footstalks reddish and downy, stout, measuring full ½ in. Catkins of the female cylindrical. (*Smith.*) A very distinct sallow, soon recognised to be different from *S.* macrostipulàcea (*Forbes*) by its downy germen, and much larger leaves. (*Id.*) There are plants at Woburn, Henfield, and Flitwick (where there is a var. called *S.* a. alpìna), and also at Messrs. Loddiges's. Specimens from the latter arboretum, also bearing the names of *S.* serpyllifòlia and *S.* rèpens, were *S.* acuminàta.

App. i. *Viminàles in the Country, but not described.*

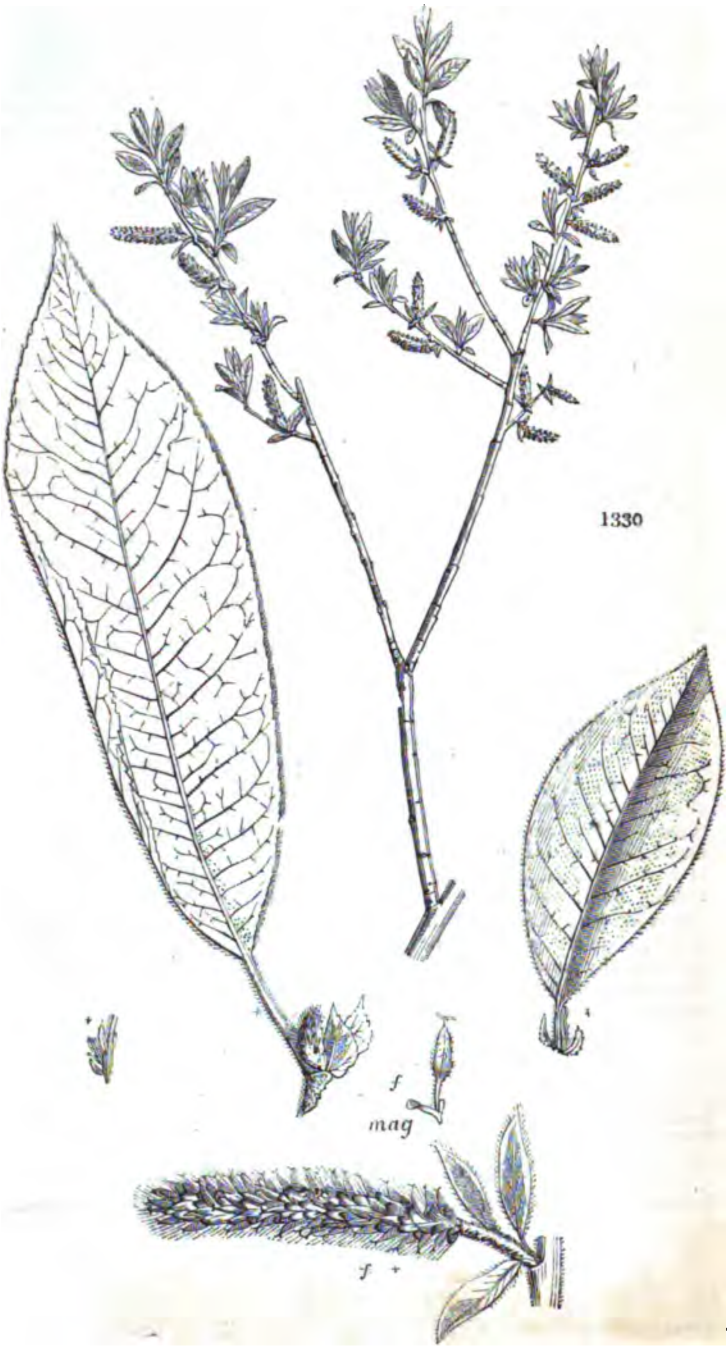
S. trichocárpa. A specimen obtained from Messrs. Loddiges, under this name, seems the same as *S.* incàna, according to a specimen of the latter obtained of Mr. Brooks; but it may be an allied kind, not yet described.

Group xvi. *Cinèreæ* Borrer.

Sallows. — Trees and Shrubs, with roundish shaggy Leaves, and thick Catkins.



Stamens 2 to a flower. Ovary tomentose with silky tomentum. Leaves



1330

mostly obovate, toothed, grey or hoary, more or less wrinkled; very veiny beneath; stipuled branches downy. Plants trees or shrubs. The group includes the kinds of willow that are usually called the sallows. (*Hook. Br. Fl.*, ed. 2., adapted.) The sallows are known by their obovate, or rounded, downy leaves, and thick, early, silken catkins, with prominent, yellow, distinct stamens, 2 to a flower. (*Smith Eng. Fl.*, iv. p. 216.) Not a few of the group Nigricántes *Borrer* also have been regarded as sallows. Mr. Borrer, however, states that he is unacquainted with many of the species, or supposed species, of this group, and of the group Nigricántes; and it is highly probable that many of them are placed wrongly. (*Borrer* in a letter.)

■ 83. *S.* PA'LLIDA *Forbes*. The pale Willow.

Identification. Forbes in Sal. Wob., No. 96.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 96.; and *fig.* 96. in p. 1620.

Spec. Char., &c. Leaves lanceolate, obovate, acute, serrated; villous and veiny above; beneath reticulated, glaucous, and cottony. Branches slender, pale, villous. Stigmas ovate, deeply toothed or cloven at the base. Ovary nearly sessile, ovate, lanceolate, silky. Style scarcely so long as the ovate undivided stigmas. (*Sal. Wob.*, p. 191.) A native of Switzerland. Introduced in 1823, and flowering in April and May. Stem erect. A slender-growing shrub, with short, palish green, round, villous branches; those of the preceding year brownish green, glabrous, and delicately warty. The leaves about 2 in. long, obovate-lanceolate, or often somewhat spathulate; dull green, veiny, and villous on their upper surface; glaucous, downy, or rather covered with a whitish cottony substance, beneath, and reticulated; the midrib and arched veins prominent. Footstalks shortish. Ovary almost sessile. There are plants at Woburn, and in the Goldworth and Hackney arboretums.

■ 84. *S.* WILLDENOVIA'NA Forbes. Willdenow's Willow.

Identification. Forbes in Sal. Wob., No. 41.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Forbes in Sal. Wob., No. 41.; and *fig.* 41. in p. 1613.

Spec. Char., &c. Leaves elliptic lanceolate, toothed, or bluntly serrated at the base and tip; the old leaves glabrous and glaucous beneath; young ones densely downy. Stipules large, half-heart-shaped, toothed, glabrous. Branches glabrous, villous when young. Ovary stalked, very silky, ovate. Style glabrous. Stigmas notched. (*Sal. Wob.*, p. 81.) Native country uncertain. A low-growing shrub, with brownish branches, which are green and villous when young. The catkins appear in April, and again in August. "A very distinct and handsome species. The leaves bear a similarity to those of the *M*yrìca caroliniàna, but are much larger on the young shoots. The *S.* myricöìdes *Mühlenberg* (*Smith* in *Rees's Cyclo.*) is a very different plant." (*Forbes.*)

■ 85. *S.* PONTEDERA'NA Willd. Pontedera's Willow.

Identification. Willd. Sp. Pl., 4. p. 661.; Smith in Rees's Cyclo., No. 18.; Koch Comm., p. 24.; Forbes in Sal. Wob., No. 43.
Synonymes. *S.* pumila alpina nigricans, folio oleagino serrato, *Ponted. Comp.*, 148, 149.; *S.* Pontedèræ Bellardi App. ad Fl. Ped., 45.; Vill. Delf., 3. p. 766.
The Sexes. The male is noticed in Koch's specific character; the female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob.. No. 43.; our *fig.* 1331.; and *fig.* 43. in p. 1613.

Spec. Char., &c. Leaves elliptical, serrated, acute, glabrous; glaucous beneath, and obtuse at their base; the midrib, footstalks, and young leaves hairy. Ovary oblong and downy. (*Sal. Wob.*, p. 85.) A native of Switzerland. Introduced in 1821, and flowering before the expansion of the leaves, in April. It is described by Willdenow as a shrub, 2 ft. or 3 ft. high; but, in the Woburn salictum, Mr. Forbes has found it attain the height of 12 ft. or 13 ft. in four years. In the Horticultural Society's Garden, crowded

1331



among other species of Sálix, it was 16 ft. high in 1834, after being 10 years planted. This species forms an upright bushy shrub or tree, with elliptical leaves; the lower ones entire; the upper finely serrated, green, and a little villous; shining above; glaucous, pubescent, reticulated, and whitish beneath. There are plants at Woburn, Flitwick, Henfield, Goldworth, and Hackney.

⚘ 86. *S.* MACROSTIPULA'CEA *Forbes*. The large-stipuled *Sallow*.

Identification. Forbes in Sal. Wob., No. 130.
The Sexes. The female is described and figured in *Sal. Wob*.
Engravings. Sal. Wob., No. 130.; and *fig*. 130. in p.1627.

Spec. Char., &c. Leaves elliptic-lanceolate, somewhat obovate, pointed, serrated, entire towards the base; upper side dull green and glabrous, glaucous beneath. Stipules very large, toothed, often cloven. Ovary stalked, ovate-subulate, glabrous. Stigmas parted. (*Sal. Wob.*, p. 259.) A native of Switzerland. Introduced in ? 1824, and flowering in April and May. A rapid-growing tree, with dark green, round, downy branches, marked with small yellow or reddish spots; the lower branches pendulous. Leaves elliptic-lanceolate, acute, 3 in. or 4 in. long, and 1½ in. or more in breadth; base obtuse, entire, dilated above the middle; margins rather distinctly serrated; the upper side green and glabrous; under side glaucous, with a downy midrib and veins. Footstalks reddish and downy, stout, measuring full ½ in. long. Stipules large. Young leaves purplish, soft to the touch, and pubescent. Adult ones rather coriaceous, copiously marked beneath with dark blotches. Catkins of the female from 1½ in. to 2 in. long. There are plants at Woburn, Henfield, and Flitwick, and also at Hackney.

■ ⚘ 87. *S.* INCANE'SCENS *? Schl.* The whitish-*leaved Sallow*.

Identification. ? Schl. as quoted in Sweet Hort. Brit., ed. 1830, p. 469.; Forbes in Sal. Wob., No. 120.
The Sexes. The female is described and figured in *Sal. Wob*.
Engravings. Sal. Wob., No. 120.; and *fig*. 120. in p. 1625.

Spec. Char., &c. Leaves elliptic, obovate, serrated or denticulated; greyish green and downy above; very downy, whitish, and reticulated beneath. Stipules rounded, serrated. Ovary ovate-lanceolate, downy. Style short. Stigmas ovate, entire. (*Sal. Wob.*, p. 239.) A native of Switzerland. Introduced in 1823. Flowering in March, at which time the catkins are nearly sessile; and again in August. A bushy shrub or tree; the branches round, pubescent, and of a muddy green colour, marked with a few yellow spots, having the appearance of being besmeared with clay. Leaves obovate, about 2 in. long, and a little more than 1 in. wide; margins a little revolute; deeply denticulated; denticles a little glandular; the upper side densely pubescent, wrinkled; the midrib ferruginous; beneath, pubescent, reticulated, of a whitish colour, with prominent arched veins; midrib pale beneath, and prominent. Footstalks shortish and stout, dilated at the base, and downy. Catkins from 1 in. to 1½ in. long, appearing before the expansion of the leaves, in March; and again in August. "Ill adapted to any useful purpose." (*Forbes*.)

■ ⚘ 88. *S.* PANNO'SA *Forbes*. The cloth-*leaved Sallow*.

Identification. Forbes in Sal. Wob., No. 123.
The Sexes. The female is described and figured in *Sal. Wob*.
Engravings. Sal. Wob., t. 123.; and *fig*. 123. in p. 1626.

Spec. Char., &c. Leaves elliptic-obovate, serrated; green and downy above, greyish and densely pubescent beneath. Stipules large, serrated, glaucous. Ovary ovate-lanceolate, silky, on a short footstalk. Style glabrous. Stigmas undivided. (*Sal. Wob.*, p. 245.) A native of Switzerland. Introduced in 1824, and flowering, in the Woburn salictum, in April and May. A small tree, growing to the height of 12 ft. or 14 ft., with oblique spreading branches, which are of a darkish fuscous colour, and closely covered with a short pubescence; the young twigs are of a greyish brown, and densely downy. Leaves from 1½ in. to 2 in. long, about 1 in. in breadth; elliptic-obovate; dull

green and downy on their upper surface; greyish, densely pubescent, and denticulated with prominent arched veins beneath; the small ones nearly covered with pubescence; the margins serrated, entire towards the base; tip oblique. Many of the leaves are opposite or nearly so, and alternate, on the same branch. Footstalks stout. Catkins about 1 in. long. There are plants at Woburn, Flitwick, Henfield, and Hackney.

? *Variety*. Mr. Forbes received a kind of *Sàlix*, under the name of *S.* mόllis, which, as compared with *S.* pannòsa, had its leaf, catkin, ovary, and bráctea larger; and the catkins often recurved, and devoid of floral leaves. Mr. Forbes expresses himself doubtful whether it is sufficiently distinct from *S.* pannòsa to constitute a distinct species.

■ 89. *S.* MUTA'BILIS *Forbes*. The changeable Willow, *or Sallow*.

Identification. Forbes in Sal. Wob., No. 160.
The Sexes. The female is described in *Sal. Wob.*

Spec. Char., &c. Leaves elliptic, remotely serrated; dull green and pubescent above; pale glaucous and hairy beneath. Stipules rounded, serrated, and minute. Ovary stalked, ovate-lanceolate, silky. Style somewhat elongated and stout. Stigmas cloven. It bears an affinity to *S.* pannòsa in catkins and mode of growth. (*Sal. Wob.*, p. 288.) A native of Switzerland. Introduced in ? 1824, and flowering in March and April. Branches densely downy, copiously beset with somewhat elliptical leaves, which are of a dull green colour above, pale and hairy beneath, with prominent veins, the subdivisions of which form a rectangular network; their substance is rather of a thin crackling texture; the young leaves are very hairy in their earliest state. There are plants at Woburn and in the Hackney arboretum.

⚘ 90. *S.* CINE'REA *L.* The *grey Sallow, or* ash-coloured Willow.

Identification. Lin. Sp. Pl., 1449.; Willd. Sp. Pl., 4. p. 690., exclusively of the syn. of Villars; Smith in Rees's Cyclo., No. 94., where Smith has remarked that Willdenow's description disagrees, in some points, with his plant; Smith Eng. Bot., t. 1897.; Eng. Fl., 4. p. 215.; Forbes in Sal Wob., No. 125.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 250.
Synonymes. *S.* cinèrea var. *Koch Comm.*, p. 36. The following information is derived from Mr. Borrer. Smith has erroneously cited, in his *Fl. Br.*, p. 1063., the *S.* daphnöides *Villars* as a synonyme of *S.* cinèrea *Smith*; and this has led Koch (*Comm.*, p. 23.) to cite *S.* cinèrea *Smith* as a synonyme of *S.* daphnöides *Villars*.
The Sexes. Both sexes are figured in *Sal. Wob.* The male is figured in *Eng. Bot.*
Engravings. Eng. Bot., t. 1897.; Sal. Wob., No. 125.; our *fig.* 1332.; and *fig.* 125. in p. 1626.

Spec. Char., &c. Stem erect. Lower leaves entire; upper serrated, obovate-lanceolate; glaucous, downy, and reticulated with veins beneath. Stipules half-heart-shaped, serrated. Ovary silky; its stalk half as long as the lanceolate bracteas. (*Smith Eng. Fl.*) A native of England, on the banks of rivers and in moist woods; and flowering, in the willow garden at Woburn Abbey, in April, and again in September. The following description is taken from the more detailed one of Smith in his *English Flora*: — " A tree, 20 ft. or 30 ft. high, if left to its natural growth; but in hedges or thickets it is more dwarf and bushy. It is readily to be distinguished from other common willows, by its rusty glittering hue, which lies more, perhaps, in the fine veins of its leaves, than in the pubescence sprinkled over them, which consists of minute, prominent, shining hairs, totally unlike the depressed silkiness of the species of the groups Glaúcæ, Fúscæ, and *R*osmarinifòliæ. The rusty colour, indeed, increases after the specimens have been long dried, but



1332

is visible in some degree in the growing plant, especially towards the autumn. The branches are glabrous, reddish brown, and crooked; and the young ones are slender, spreading, and, in an early state, downy. On the leafy branches of the year the lower leaves are nearly or quite entire, 1 in. or 1½ in. long, obovate, with a short oblique point, on shortish slender footstalks, without stipules; the upper ones twice as large, variously

serrated, with half-heart-shaped stipules, strongly serrated, or toothed, various in size, but never very large." According to Smith, *S.* cinèrea is the least useful of the sallows; but its branches, when two years old, are used for bands and coarse wickerwork. There are plants at Woburn, Flitwick, and in the Hackney arboretum.

Varieties. There are several varieties of this species, one of which has variegated leaves; and, as this is a rare character among willows, it merits a distinct notice. Smith, in his *English Flora*, iv. p. 216., notices having received a specimen of such a variety from Germany. Mr. Forbes has since found two plants with slightly variegated leaves, growing in the Woburn plantations. He has figured some of these leaves, from which it appears that they are blotched with small yellow blotches. Koch has referred to *S.* cinèrea *L.*, as varieties, *S.* cinèrea *Smith*, *S.* aquática *Smith*, and *S.* oleifòlia *Smith*.

♆ 91. *S.* AQUA'TICA *Smith*. The Water *Sallow*, *or* Willow.

Identification. Smith Fl. Br., p. 1065.; Willd. Sp. Pl., 4. p. 701.; ? Hayne Abbild., p. 248.; Smith Eng. Bot., t. 1437.; in Rees's Cyclo., No. 118.; Eng. Fl., 4. p. 218.; Forbes in Sal. Wob., No. 127.; Hook. Br. Fl., ed. 3.; Mackay's Fl. Hibern., pt. 1. p. 250.
Synonyme. *S.* cinèrea var. *Koch Comm.*, p. 36.
The Sexes. Both sexes are figured in *Sal. Wob.*, and in *Hayne Abbild.*, if the kind is identical: the female is figured in *Eng. Bot.*
Engravings. ? Hayne Abbild., t. 191.; Eng. Bot., t. 1437.; Sal. Wob., No. 127.; and our *fig.* 127. in p. 1627.

Spec. Char., &c. Stem and branches erect. Leaves slightly serrated, obovate-elliptical, minutely downy, flat, rather glaucous beneath. Stipules rounded, toothed. Ovary silky, stalked. Stigmas nearly sessile. (*Smith Eng. Fl.*) A native of England, in wet hedgerows, swampy places, &c.; and flowering in April. Most of the following particulars are derived from Smith's description given in his *English Flora*: — Stem generally bushy, rarely forming a tree. Branches numerous, upright; the young ones slender, hoary, or finely downy, leafy throughout, often angular. Leaves on rather slender downy footstalks, elliptic-oblong, acute, about 2 in. in length, flat, not wavy, though serrated about the middle and towards the extremity, narrowest at the base; the lower ones on each branch gradually smaller, quite entire, obovate, rounded and obtuse; the lowest of all not ½ in. long, all soft and pliant, of a dull greyish green, reticulated with minute veins; not rugged, but even, and finally glabrous on the upper side; glaucous and minutely downy underneath. Catkins appearing before the leaves. A perfectly distinct kind from *S.* cinèrea and *S.* oleifòlia; being without the rusty hue of these species upon the leaves, which are also much broader, and of a thinner texture. The branches, or twigs, are very brittle, and not adapted to any economical purpose, except that, perhaps, of being used for fire-wood.

♆ 92. *S.* OLEIFO'LIA *Smith*. The Olive-leaved Willow, *or Sallow*.

Identification. Smith Fl. Br., p. 1065.; Willd. Sp. Pl., 4. p. 702.; Smith Eng. Bot., t. 1402.; Rees's Cyclo., No. 119.; Eng. Fl., 4. p. 219.; Forbes in Sal. Wob., No. 126.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 251.
Synonyme. *S.* cinèrea var. *Koch Comm.*, p. 36.
The Sexes. Both sexes are figured in *Sal. Wob.*: the male is figured in *Eng. Bot.*
Engravings. Eng. Bot., t. 1402.; Sal. Wob., No. 126.; and *fig.* 126. in p. 1626.

Spec. Char., &c. Stem erect. Branches straight and spreading. Leaves obovate-lanceolate, flat, rather rigid, minutely toothed, acute, glaucous, reticulated, and finely hairy beneath. Stipules small, notched, and rounded. Catkins oval, nearly half as broad as long. (*Smith E. F.*) A native of England, in wet hedgerows; and flowering, in the willow garden at Woburn Abbey, in March, and again in August. The following particulars are derived from *Eng. Fl.* and *Sal. Wob.*, chiefly from the former. Truly arboreous; and, if allowed to grow, becoming as tall as a common crab tree, though not of so stout a habit as *S.* càprea, except as regards the catkins. The branches are rounded, and, when young, somewhat angular, brown, more or less hoary with short down, very soft to the touch. The leaves spread but moderately, and are from 2 in. to 3 in. in length, and 1 in., at most, in breadth, elliptic-

lanceolate, tapering at each end, and somewhat obovate, acute, not pointed; at first sight, seeming entire or minutely serrated: but they are more generally bordered with glandular teeth: the upper side is green, flat, even, obscurely hoary rather than downy; under side paler, slightly glaucous, with copious, prominent, reticulated, minutely hairy veins, acquiring by time a portion of the rusty hue of *S.* cinèrea. Their substance is firm rather than coriaceous; and in the earliest state they are densely downy. Footstalks rather short and downy. Catkins remarkably large, appearing before the leaves; and that of the female about 2 in. long when at maturity. Distinguished from *S.* cinèrea and *S.* aquática by the coriaceous texture of its leaves, which very much resemble those of Quércus I'lex. When cut down, the plant produces tough twigs, that are adapted for baskets or wickerwork. The two-years-old shoots may also be used with advantage for making wattled hurdles, crates, &c.; but they are inferior to those of *S.* cinèrea. There are plants at Woburn, Flitwick, and Goldworth.

¥ 93. *S.* GEMINA'TA *Forbes.* The twin-*catkin Sallow, or* Willow.

Identification. Sal. Wob., No. 129.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 129.; and *fig.* 129. in p. 1627.

Spec. Char., &c. Leaves obovate-lanceolate, serrated; deep green, shining, and veiny above; reticulated, hairy, and paler beneath. Stipules rounded and toothed. Branches brownish, downy when young. Catkins large, often two or three bursting forth from the same bud. Anthers yellow. Bractea obovate and hairy. (*Sal. Wob.*, p. 257.) Native country not stated: perhaps it is Britain; for Mr. Forbes received the kind from Sir J. E. Smith under the name of *S.* cinèrea; and a specimen of the same kind has subsequently been observed in the Smithian herbarium. Introduced in ? 1824, and flowering in March. This appears a rapid-growing tree, producing long, round, brown, brittle branches, downy only when young, and distantly marked with yellow spots. The upper leaves are above 3 in. long, with sharp points, serrated, and of an ovate-lanceolate shape; the lower obovate, with short oblique points, and rather more than 1 in. broad above the middle; entire, glabrous, and shining on their upper surface, except while young, when they are hairy on both sides; beneath, copiously besprinkled with minute, depressed, shining hairs, and very distinctly reticulated with prominent arched veins in every stage of growth. Footstalks downy, dilated at the base, somewhat decurrent and brown on their upper side. Catkins of the male about 1 in. long. Distinguished from *S.* cinèrea by its long narrow leaves; large, obtuse, twin catkins; and obovate, large, rounded bracteas. There are plants at Henfield.

■ 94. *S.* CRI'SPA *Forbes.* The crisp-*leaved* Willow.

Identification. Forbes in Sal. Wob., No. 42.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 42.; and *fig.* 42. in p. 1613.

Spec. Char., &c. Leaves ovate-lanceolate, crisped, wavy; glabrous above; glaucous, reticulated, and slightly hairy when young, beneath. Stipules half-heart-shaped, deciduous. Branches pale green. Catkins small, rounded. Anthers red before they burst, afterwards yellow. Gland bifid or trifid, reddish. Bractea obovate, fringed. (*Sal. Wob.*, p. 83.) Native country uncertain. A low-growing shrub, with round, glabrous pale green branches, which are villous only at their extremities when young. The catkins are small, and burst forth before the leaves, in March; amongst the earliest-flowering of the species. The plant flowers again, a second time, in August.

■ 95. *S.* AURI'TA *L.* The *round-*eared, *or trailing, Sallow, or* Willow.

Identification. Lin. Sp. Pl., 2. p. 1446.; Hoffm. Sal., 1. 30. t. 4. f. 1. 2., t. 22. f. 1.; Willd. Sp. Pl., 4. p. 700.; Hayne Abbild., p. 246.; Koch Comm., p. 38.; Smith Lin. Fl. Lapp., 303. t. 8. f. y; Eng. Bot., t. 1487.; Rees's Cyclo., No. 117.; Eng. Fl., 4. p. 216.; Forbes in Sal. Wob., No. 124.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 251.

Synonyme. S. uliginòsa *Willd. Enum.*, 1007. (*Smith* and *Koch*); the trailing Sallow, so called in Norfolk. (*Smith E. F.*)
The Sexes. Both sexes are described in *Eng. Fl.*, and figured in *Eng. Bot.*, in *Sal. Wob.*, and in *Hayne Abbild.*
Engravings. Hoffm. Sal., 1. t. 4. f. 1., 2. t. 22. f. 1.; Smith Lin. Fl. Lapp., t. 8. f. y; Hayne Abbild., t. 188.; Eng. Bot., t. 1487.; Sal. Wob., No. 124.; and our *fig.* 124. in p. 1626.

Spec. Char., &c. Branches trailing. Leaves somewhat serrated, convex, obovate, obtuse, with a small hooked point; hairy, and reticulated with veins, on both sides. Stipules roundish, convex, toothed. Ovary silky, stalked. Stigmas nearly sessile. (*Smith Eng. Fl.*) A native of England, in moist woods and thickets; flowering in April and May. Stem bushy, usually 3 ft. or 4 ft. high. "Branches spreading, or trailing, either amongst other bushes, or on the ground, to a great extent. Leaves various in size, on short, stout, downy footstalks, obovate, generally 1 in. or 2 in. long, more or less contracted towards the base, though sometimes rounded, or nearly ovate in that part: their termination is often remarkably obtuse or abrupt, with a broad, short, recurved, hooked, or oblique point; both sides hairy, and very rugged; the upper side dark green, wrinkled like a cabbage leaf; under side paler, rather glaucous." (*Smith Eng. Fl.*) "The leaves occasionally form permanent rosaceous tufts like those of *S. Hèlix*." (*Ibid.*) There are male and female plants both at Woburn Abbey and in Messrs. Loddiges's arboretum; and from the latter we have received a specimen of *S.* ambígua, which seems to be *S.* aurìta.

Varieties. Koch and Smith have referred the *S.* uliginòsa *Willd.* and *S.* aurìta *Willd.* to the *S.* aurìta *L.*; and Koch has thus contradistinguished the two former: — *S.* uliginòsa *Willd.* Taller. Leaves obovate. *S.* aurìta *Willd.* Dwarfer. Leaves roundish-obovate, smaller by half. Mr. Forbes has noticed that a variety was growing in the Woburn plantations which was about 1 ft. or 1 ft. 6 in. high, and had its leaves truly obovate. Koch has deemed the *S.* cladostémma *Hayne Dendr. Fl.*, p. 191. and fig. B, C, a singular variety of *S.* aurìta, and characterised it as having 2, 3, or 4 stamens to a flower, and these with their filaments connate to beyond the middle. We have a specimen obtained of Messrs. Loddiges, under the name of *S.* aurìta microphýlla, whose leaves are oblong, and do not look of the affinity of *S.* aurìta. Smith judged (*Flor. Brit.* and *Eng. Fl.*) the *S.* càprea pùmila, folio subrotundo, subtus incano, of Dillenius in *Raii Syn.*, to be a dwarf variety of *S* aurìta; but Mr. Borrer has expressed, in *Eng. Bot. Supp.*, t 2733., his opinion that this "is probably a synonyme of *S.* ambígua."

■ 96. *S.* LATIFO`LIA *Forbes.* The broad-leaved Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 118.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 118.; and *fig.* 118. in p. 1625.

Spec. Char., &c. Leaves broadly elliptic, distantly denticulated towards the base, and finely serrated towards the point. Stigmas half-moon-shaped, serrated, glabrous, and large. Capsules ovate, silky, and footstalked. Bractea ovate, hairy. Style about the length of the stigmas. (*Sal. Wob.*, p. 235.) Native country not stated. Flowering in March. A straggling plant, with strong, round, pubescent branches, which are of a brown fuscous colour, and become nearly glabrous towards the lower end in autumn. Leaves of a large elliptical form, a little heart-shaped and unequal at the base; above, green and shining; beneath, glaucous, downy, and reticulated; the margins remotely denticulated, and nearly entire towards the base; finely serrated at the apex. Footstalks ½ in. long, and pubescent. Catkins nearly 1 in. long when at maturity. A kind quite distinct from every other of this section, and remarkable for the breadth of its leaves, which differ in texture from those of *S.* grisophýlla, that are also broad. There are plants at Woburn, Henfield, and in the Goldworth Arboretum.

♣ 97. *S.* CA`PREA *L.* The Goat Willow, *or the great round-leaved Sallow.*

Identification. Lin. Sp. Pl., 1448. α (*Smith*); Willd. Sp. Pl., 4. p. 703., exclusively of the synonyme of Fl. Dan. (*Smith*); Hayne Abbild., p. 249.; Smith Eng. Bot., t. 1488.; Rees's Cyclo., No. 126.;

Eng. Fl., 4. p. 225.; Forbes in Sal. Wob., No. 122.; Hook. Br. Fl., ed. 3., p. 429.; Mackay Fl. Hibern., pt. 1. p. 252.

Synonymes. S. caprea *Koch*, part of, *Koch Comm.*, p. 37.; common Black Sallow, Saugh in *Yorkshire*, Grey Withy.

Derivation. The name caprèa seems to have originated in the reputed fondness of goats for the catkins, as exemplified in the wooden cut of the venerable Tragus, their namesake. (*Smith* in *Eng. Fl.*)

The Sexes. Both sexes are figured in *Sal. Wob.*, and both in *Hayne Abbild.*

Engravings. Hoffm. Sal., t. 3. f. 1., 2. t. 21. f. a. b. c. (*Smith*); Hayne Abbild., t. 192.; Eng. Bot., t. 1488.; Sal. Wob., No. 122.; our *fig.* 1333., from the *Sal. Wob.*; and *fig.* 1334., representing the male, and *fig.* 1335 the female, both from Host's *Sal. Aust.*, t. 66, 67.; and *fig.* 122. in p. 1626.

1333



1334



Spec. Char., &c. Stem erect. Leaves roundish-ovate, pointed, serrated, waved; pale and downy beneath. Stipules somewhat crescent-shaped. Catkins oval. Ovary stalked, ovate, silky. Stigmas nearly sessile, and undivided. Capsules swelling. (*Smith E. F.*) A native of Britain, in woods and dry pastures, common; flowering in April and May. The following traits are derived from Smith's fuller description in his *English Flora*: — "A moderate-sized tree, with spreading, round, brown or purplish branches, minutely downy when young. Leaves larger and broader than in any other of the genus; of a deep green above, with a downy rib; white underneath, or rather glaucous, veiny, densely clothed with soft, white, cottony down; generally broadly ovate, approaching to orbicular, with a sharp point; sometimes more elliptical, either rounded or slightly heart-shaped at the base; varying in length from 2 in. to



1335

3 in.; the margin wavy, and more or less strongly serrated. Footstalks stout, downy. Catkins numerous, much earlier than the foliage, and almost sessile." This tree, Sir W. J. Hooker observes, "distinguishes itself, in the spring, by being loaded with handsome yellow blossoms before any of its leaves appear. The catkins," both of the male and the female, "are broader and shorter than in most of the species with crowded flowers." "This species," Mr. Forbes observes, "has several very valuable qualities. The bark serves the Highlanders for tanning, and is no indifferent substitute for the cinchona in agues. The wood, being white, tough, and smooth in grain, forms excellent hurdles, and good handles for hatchets. It is also used for charcoal, and in the manufacture of gunpowder, &c. The catkins are much resorted to by bees for honey." (*Sal. Wob.*, p. 243.) According to Mitchell, it is the best underwood for coppices that we have. It makes good fences; and sheep-hurdles made of it will last a year or two longer than those made of hazel; and they will suit every situation, wet or dry. (*Dendrologia*, p. 56.) The flowering branches of this species are called palms, and are gathered by children on Easter Sunday; the relics of the Catholic ceremony formerly performed in commemoration of the entry of our Saviour into Jerusalem. (See *Dr. Johnston's Flora of Berwick upon Tweed.*)

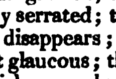
■ 98. *S.* SPHACELA'TA *Smith*. The withered-*pointed-leaved* Willow, *or Sallow.*

Identification. Smith Fl. Br., p. 1066.; Willd. Sp. Pl., 4. p. 702.; Smith in Rees's Cyclo., No. 125.; Eng. Bot., t. 2333.; Eng. Fl., 4. p. 224.; Forbes in Sal. Wob., No. 121.; Hook. Br. Fl., ed. 3., p. 429.
Synonymes. S. cäprea var. *Koch Comm.*, p. 38.; *S.* cäprea *β Wahl. Carpat.*, p. 319. "I received S. sphacelàta *Smith*, for the *S.* populifòlia *Schleicher*." (*Forbes* in *Sal. Wob.*)
The Sexes. Both sexes are described in *Eng. Fl.*, and figured in *Eng. Bot.* and in *Sal. Wob.*
Engravings. Eng. Bot., t. 2333.; Sal. Wob., No. 121.; and *fig.* 121. in p. 1625.

Spec. Char., &c. Stem erect. Leaves elliptic-obovate, even, veiny, entire, or slightly serrated; downy on both sides; discoloured at the point. Stipules half-heart-shaped, toothed, erect. Ovary stalked, ovate-lanceolate, silky. Stigmas notched, longer than the style. (*Smith Eng. Fl.*) A native of Britain; found, in Scotland, near the head of Loch Tay; and flowering in April and May. A small bushy tree, 5 ft. or 8 ft. high; the young branches very soft with dense, hoary, short, velvet-like down. Leaves, in like manner, soft and downy, especially when first opening; always of a greyish aspect; their shape obovate or elliptical, with a small oblique point; their length 1½ in., perhaps 2½ in. at their full growth; the margin either quite entire, or slightly, sparingly, and unequally serrated; the upper side light green, clothed with fine down, which finally disappears; under more downy, with a prominent rib and veins, hoary, not glaucous; the tip, from its earliest formation, nearly naked, green or brownish, soon looking as if blasted or withered, and assuming a tawny hue. The footstalks are shortish, and thickly downy. Catkins on short hairy stalks, 1½ in. long when matured. Very distinct from every other British willow that Mr. Forbes has seen; and readily known by its whitish woolly leaves, which are always more or less marked with holes, and the larger ones of which are serrated in their adult state.

Group xvii. *Nigricántes* Borrer.

Shrubs with long Branches, or small Trees. Mostly Sallows.



A group as difficult to define as are the kinds of which it is constituted. Stamens 2 to a flower. Ovary stalked, glabrous or silky. Style more or less 2-cleft. In leaves, many of the kinds approach those of the group Cinèreæ very nearly, having ovate or obovate ones; but the leaves are less wrinkled. Plants shrubs with long branches, or small trees. (*Hook. Br. Fl.*, ed. 2.) The term Nigricántes has been applied to this group, not, as it

has been supposed, in allusion to the leaves of the kinds of which it is constituted turning black in drying, but to mark their affinity to *S.* nígricans *Smith*, a well-known individual of their number. (*Borrer* in *Eng. Bot. Suppl.*, t. 2795.) In this case, it may be supposed that the characters of *S.* nígricans *Smith* are pretty well representative of those of each of the kinds of the group. Some of the characters of *S.* nígricans *Smith* are described below, No. 108. According to Mr. Borrer (*Eng. Bot. Suppl.* t. 2729,) it is doubtful, in application to almost every kind of the group, whether it is a species or not.

It is shown, under the preceding group, that Mr. Borrer professes himself not acquainted with all the kinds of that group and this; and that he may, therefore, have placed some of them wrongly. It may interest the lovers of broad grounds of distinction in species to know that Koch, who has applied this principle to the willows, has included several of the kinds in this group, which are treated below as distinct species, in one species. Under his species *S. p*hylicifòlia, he has cited *S. p*hylicifòlia *Lin. Sp. Pl.*, ii. 1442., *Willd. Sp. Pl.*, iv. p. 659., exclusively of the synonyme of Smith, *Wahlenb. Fl.Lapp.*, No. 482.; *S.* stylòsa *Dec.*; *S.* stylàris *Seringe*; *S.* hastàta *Hoppe*; and *S.* hýbrida *Hoffm.*; as synonymes: and the following as being still the species, under a more or less varied form, — *S.* nígricans *Smith*, *S.*Ammanniàna Willd., *S.* Andersoniàna Smith, *S.* spirææfòlia *Willd.* ex *Link*, *S.* rupéstris *Smith*, *S.* Forsteriàna Smith, *S.* hírta *Smith*, *S.* cotinifolia *Smith*, and *S.* ulmifòlia *Hort. Berol.* He has intimated, besides, that several of the kinds distinguished by Schleicher also belong to this species. Dr. Lindley, in his *Synopsis of the British Flora*, where he has followed Koch wholly, has added to Koch's *S. p*hylicifòlia the kinds *S.* damascèna *Forbes* and *S.* Borreriàna Smith. Relatively to the principle of rendering species in the willows thus comprehensive, Mr. Borrer makes the following remark in *Eng. Bot. Suppl.*, t. 2702.: — "We have repeatedly disclaimed all dogmatical decision as to what are species among the willows; nor have we ever denied the probability that many of those which, in the present state of our knowledge, we think it expedient to propose as distinct may be, in reality, mere seminal varieties or hybrids. This being admitted, the further admission can scarcely be withheld, that those botanists may possibly be correct in their views who regard, in some instances, as species what we are accustomed to regard as sections of the genus." Mr. Borrer has added, "Of these *facilè princeps* is Koch, whose lucid *De Salicibus Europæis Commentatio* displays a most intimate acquaintance with his subject." With regard to the details of Koch's adjudication of the above-cited species *S. p*hylicifòlia, Mr. Borrer gives the following corrective notices, which, for the sake of accuracy, we give below: —

Under *S.* damascèna *Forbes*, *Eng. Bot. Suppl.*, t. 2709., it is remarked, "Koch would, no doubt, refer *S.* damascèna, as he does its affinities, *S.* Andersoniàna, *S.* nígricans, &c., to Wahlenberg's *S. p*hylicifòlia; but those botanists would scarcely have appropriated the name to willows of this set, had they been aware of the fact that the original Lapland specimen of *S. p*hylicifòlia in the Linnæan herbarium is indubitably, as was long since stated by Smith, the *S. p*hylicifòlia of *Eng. Bot.*, t. 1958. This last is united by Koch, with numerous affinities, to *S.* arbúscula of Wahlenberg, which he regards as the *S.* arbúscula of the Linnæan *Flora Suecica*." Under *S.* tenuifòlia *Smith* this remark occurs in *Eng. Bot. Suppl.*, t. 2795.: — "*S.* tenuifòlia and *S.* rupéstris are so nearly allied, that we cannot undertake to point out satisfactory distinctions; yet Koch places *S.* tenuifòlia under *S.* arbúscula, and *S.* rupéstris under *S. p*hylicifòlia." Under *S.* petræ'a *Eng. Bot. Suppl.*, t. 2725., is this remark: — "It is surely by error that Koch has placed *S.* petræ'a under his *S.* arbúscula, with *S. p*hylicifòlia of Smith; and not under his own *S. p*hylicifòlia, with *S.* Ammanniàna and its affinities."

99. *S.* AUSTRA'LIS *Forbes.* The southern *Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 103.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 103.; and our *fig.* 103. in p. 1621.

Spec. Char., &c. Leaves elliptical, acute, slightly serrated; glaucous beneath. Stipules large, heart-shaped, serrated, and downy. Catkins appearing before the leaves. Ovary glabrous, stalked. Styles longer than the divided stigmas. (*Sal. Wob.*, p. 205.) A native of Switzerland. Introduced in 1824, and flowering in April and May. A low, upright, bushy shrub, with reddish brown downy branches. The leaves from 1½ in. to 2 in. in length, and about 1 in. in breadth; of an ovate-elliptic shape, acute at the point; their margins slightly serrated; upper surface dull green, and a little downy; beneath, glaucous, and more downy, but ultimately becoming nearly glabrous, particularly at the latter end of the season. Catkins on short stalks, erect; about 1 in. long. "Unfit for any useful purpose." (*Forbes.*) There are plants at Woburn, Henfield, and Flitwick, and also in the Hackney arboretum.

100. *S.* VAUDE'NSIS *Forbes.* The Vaudois *Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 117.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 117.; and our *fig.* 117. in p. 1624.

Spec. Char., &c. Leaves elliptical, serrated; dark green, shining and villous above; glaucous, reticulated, and pubescent beneath. Stipules rounded, toothed. Branches reddish, downy. Ovary ovate, stalked, downy. Style rather longer than the parted stigmas. (*Sal. Wob.*, p. 233.) A native of Switzerland. Introduced in ?1824, and flowering in March and April. A low, spreading, bushy shrub, with slender, round, downy branches, which are at first reddish, but become of a dark sooty brown colour after the first year. Leaves elliptical, somewhat obovate, with oblique points, entire towards the base, serrated above; lower leaves small, rounded, slightly crenate, and becoming ultimately nearly glabrous; upper ones dull green and villous above; but glaucous and reticulated with large prominent veins beneath, and downy. The young ones are purplish, on luxuriant shoots, above 2 in. long and 1 in. in breadth, but in their general habit little more than 1 in. in length; all of rather a thin texture, losing their pubescence when nearly full grown. Footstalks of a middling size, downy and purplish. Catkins above 1 in. in length. A very distinct kind. There are plants at Woburn and Flitwick, and in the Hackney and Goldworth arboretums.

101. *S.* GRISOPHY'LLA *Forbes.* The grey-leaved Willow, *or Sallow.*

Identification. Sal. Wob., No. 1191.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal Wob., No. 119.; and our *fig.* 119. in p. 1625.

Spec. Char., &c. Leaves elliptical, acute, denticulated; shining above, reticulated and downy beneath. Stipules large, half-heart-shaped, serrated, pubescent. Catkins nearly 1 in. long, obtuse, on short thick stalks. Bracteas elliptic and silky. (*Sal. Wob.*, p. 237.) A native of Switzerland. Introduced in 1824, and flowering in April and May. This is a strong-growing plant; the branches round, hairy, of a reddish brown colour, and somewhat angular when young. Buds large, purplish when fully grown. Leaves from 2½ in. to 3 in. long, and 1½ in. broad; rounded at the base; above, dull green and shining, besprinkled with many minute hairs; beneath, pubescent, reticulated, and of a whitish hue, with denticulated margins; the substance of the leaves of a thick coriaceous texture. Footstalks nearly ½ in. long, of a purple colour, and much dilated at the base. Catkins nearly 1 in. long when fully expanded; bursting forth before the expansion of the leaves. There are plants at Woburn and Flitwick; also in the Hackney arboretum.

■ 102. *S.* LACU'STRIS *Forbes.* The Lake Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 116.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 116.; and our *fig.* 116. in p. 1624.

Spec. Char., &c. Leaves elliptical, serrated; dull green and villous above; glaucous, reticulated, and pubescent beneath. Stipules half-heart-shaped, serrated, often cloven. Ovary stalked, awl-shaped, glabrous. Style twice the length of the ovate notched stigmas. (*Sal. Wob.*, p. 231.) A native of Switzerland. Introduced in 1824, and flowering in March. A straggling-growing shrub, with round, dark, villous, pendulous branches, greyish brown when young, and thickly covered with a short pubescence, which continues on the preceding year's shoots. Leaves serrated, elliptical; dull green, villous above; glaucous, pubescent, and reticulated with prominent veins beneath; entire at the base, with short oblique points. Footstalks brown above, pale and downy beneath, like the midrib. Catkins from 1 in. to 1½ in. long. Readily distinguished from *S.* crassifòlia by its pendulous branches and bushy mode of growth. There are plants at Woburn, Henfield, and Flitwick; also in the Hackney and Goldworth arboretums.

■ 103. *S.* CRASSIFO'LIA *Forbes.* The thick-leaved Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 115.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 115.; and *fig.* 115. in p. 1624.

Spec. Char., &c. Leaves ovate-elliptical, often heart-shaped at the base, pointed, bluntly serrated, pubescent, glaucous beneath. Branches downy. Stipules half-heart-shaped, serrated. Ovary ovate lanceolate, glabróus. Style longer than the obtuse stigmas. (*Sal. Wob.*, p. 229.) A foreign species; but the date of its introduction is not stated. It flowers, in the Woburn collection, in April and May. A bushy shrub, about 9 ft. or 10 ft. high, with dark green downy branches, very soft to the touch when young. Leaves from 1 in. to 1½ in. broad, distinctly and bluntly serrated; the serratures somewhat glandular; upper surface dark green, shining, and pubescent; beneath, glaucous, veiny, and reticulated with many prominent veins: the substance of the leaves is thick, and rather coriaceous. Footstalks stout, downy, dilated at the base. Catkins appearing before the leaves; at first short, but ultimately 2 in. long. Nearly allied to *S.* cotinifòlia; but differing from it in the thickness and downiness of its leaves, as well as in its obtuse stigmas and nectary. It also grows much stronger, and the branches are more brittle. There are plants at Woburn and Flitwick; also in the Hackney arboretum.

■ 104. *S.* COTINIFO'LIA *Smith.* The Cotinus, *or Quince,* leaved *Sallow, or* Willow.

Identification. Smith Fl. Br., p. 1066.; Eng. Bot., t. 1403.; Rees's Cyclo., No. 120.; Willd. Sp. Pl., 4. p. 702.; Eng. Fl., 4. p. 220.; Forbes in Sal. Wob., No. 114.; Hook. Br. Fl., ed. 3., p. 430.
Synonymes. S. spadicea *Villars's Dauph.*, 3777.; *S.* phylicifòlia var. *Koch Comm.*, p. 42.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1403.; Sal. Wob., No. 114.; our *fig.* 1336.; and *fig.* 114. in p. 1624.


1336

Spec. Char., &c. Stem erect. Branches spreading, downy. Leaves broadly elliptical, nearly orbicular, slightly toothed, glaucous and downy, with rectangular veins beneath. Style as long as the linear nòtched stigmas. (*Smith Eng. Fl.*) A native of Britain, in woods and on the banks of rivers; about 2 ft. high, but sometimes, if sheltered, attaining the height of 6 ft. or 8 ft.; always upright, with straight, round, brown, downy, moderately spreading branches. Leaves 1 in. or 1½ in. long, and 1 in. wide; flat, broadly elliptical, frequently almost orbicular, with a broad sharp point; the base rounded or obtuse, the margins beset with very shallow serratures, or, more generally, with small glandular teeth; upper side of a dull green,

covered with minute, depressed, scattered hairs; under side pale, or slightly glaucous, more loosely hairy, especially the rib and transverse parallel veins, the subdivisions of which compose a fine rectangular network. Catkins much earlier than the foliage. (*Ibid.*) This is a readily distinguished species; and the leaves are more heart-shaped at the base than even those of *S.* hírta. There are plants at Woburn, Henfield, and Flitwick.

■ ⚲ 105. *S.* HI'RTA *Smith.* The hairy-*branched Sallow, or* Willow.

Identification. Smith Eng. Bot., t. 1404.; Rees's Cyclo., No. 121.; Willd. Sp. Pl., 4. p. 696.; Smith Eng. Fl., 4. 221.; Forbes in Sal. Wob., No. 113.; Hook. Br. Fl., ed. 3. The first four of these, at least, relate to the male only: the fifth relates to both sexes. See, also, under *Synonyme.*
Synonyme. *S.* pícta *Schleicher* is the female of *S.* hírta. (*Forbes* in *Sal. Wob.*)
The Sexes. The male is described in *Eng. Fl.*, and figured in *Eng. Bot.* and *Sal. Wob.* The female is described in *Sal. Wob.*, and in *Hook. Br. Fl.*, ed. 2.
Engravings. Eng. Bot., t. 1404.; Sal. Wob., No. 113.; and our *fig.* 113. in p. 1623.

Spec. Char., &c. Stem erect. Branches densely hairy. Leaves elliptic-heart-shaped, pointed, finely crenate, downy on both sides. Stipules half-heart-shaped, flat, toothed, and nearly glabrous. (*Smith Eng. Fl.*) A native of Britain, in woods and on the banks of rivers; flowering in May. A small tree, remarkable for its thick, round, hoary branches, clothed very densely with prominent, close, horizontal, soft, cottony hairs. Leaves elliptic-oblong, a little heart-shaped, or cut away, at the base; from 2 in. to 3 in. in length, and at least 1 in. in breadth; sharp-pointed and flat, bordered with shallow serratures, or blunt notches; the upper surface of a dull green, minutely hairy; under side pale or glaucous, and more densely downy, particularly the rib and veins, which last are reticulated like those of *S.* cotinifòlia *Smith.* Footstalks stout, densely downy, ½ in. long. Catkins 1 in. or more in length. (*Ibid.*) There are plants at Woburn and Henfield; and in the Goldworth and Hackney arboretums.

■ 106. *S.* RIVULA'RIS *Forbes.* The River Willow, *or Sallow.*

Identification. Sal. Wob., No. 102.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 102.; and our *fig.* 102. in p. 1621.

Spec. Char., &c. Branches erect. Leaves elliptical, glabrous; glaucous and pubescent beneath when young; dark green on their upper surface. Stipules rounded, serrated. Catkins obtuse, short. Ovary stalked, ovate-lanceolate, slightly downy. Style about the length of the parted stigmas. (*Sal. Wob.*, p. 203.) A native of Switzerland. Introduced in ?1824; and flowering, in the willow garden at Woburn Abbey, in May. An erect-growing shrub, with dark mahogany-coloured branches, nearly perpendicular in their mode of growth, copiously marked with yellow dots; the young ones green and pubescent. Leaves from 1 in. to 1½ in. long, with short oblique points; generally unequal at the base; finely serrated; green and villous above when young; glaucous and hairy beneath, but soon losing their glaucous hue, and much of their pubescence; the older leaves are bright green, and almost glabrous on both sides. Footstalks rather long, slender. Catkins on short thick stalks, scarcely 1 in. long. There are plants at Woburn, Flitwick, Goldworth, and Hackney. In the latter arboretum is a variety named *S.* rivulàris mìnor *Lodd. Cat.*, ed. 1836.

⚲ 107. *S.* ATROPURPU'REA *Forbes.* The dark-purple-*branched* Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 156.
The Sexes. The male is described in *Sal. Wob.*

Spec. Char., &c. Leaves ovate, serrated; somewhat heart-shaped and unequal at the base; dark green, shining above; glaucous and finely hairy beneath. Footstalks nearly 1 in. long, downy. Stipules very large, half-heart-shaped, serrated, glabrous. Filaments yellow. (*Sal. Wob.*, p. 284.) A native of Switzerland. Introduced in 1824, and flowering in April. This is a low tree, with darkish brown branches, afterwards inclining to purple, which are copiously covered with minute hairs, and marked with small

yellow spots, and are very brittle. The leaves are from 1½ in. to 2 in. long, and nearly 1½ in. in breadth, when fully grown; of an ovate, or somewhat heart-like, shape at their base, and oblique at their tip. Upper surface dark green and shining: underneath, veiny, minutely hairy, and glaucous. Footstalks nearly 1 in. long, dilated at the base, and downy. This species, although it bears some resemblance to *S.* rivulàris, is yet very distinct. The young shoots are brittle, and not adapted for basketwork.

■ 108. *S.* CORIA'CEA *Forbes.* The coriaceous-*leaved, or,* leathery, Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 112.
The Sexes. Both sexes are described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 112.; and our *fig.* 112. in p. 1623.

Spec. Char., &c. Leaves elliptical, slightly obovate, acute, denticulated, crisped, pubescent, reticulated and glaucous beneath. Stamens long, white. Anthers 4-celled, yellow. Catkins of the female about 1 in. long, thick, obtuse. Ovary nearly sessile, ovate-lanceolate, very downy. Style longer than the deeply parted stigmas. Bractea ovate-lanceolate, hairy. Stipules rounded, serrated, glabrous. (*Sal. Wob.*, p. 223.) A native of Switzerland. Introduced in ? 1825, and flowering in March. This is a low-growing bushy shrub, attaining to the height of 7 ft. or 8 ft., with round pubescent branches, of a pale green colour, remotely marked with yellow spots. Leaves about 2 in. long, elliptic-obovate, acute; margins denticulated, crisped; upper surface of a dull shining green, besprinkled with minute appressed hairs; glaucous beneath, pubescent, with a prominent midrib, and with arched hairy veins; the substance of the leaves of a thick leathery texture. Footstalks stoutish and yellow. Catkins nearly 1 in. long, densely downy before they are expanded. There are plants at Woburn, Flitwick, and Hackney.

■ 109. *S.* NI'GRICANS *Smith.* The dark *broad-leaved* Willow.

Identification. Smith Eng. Bot., t. 1213.; Willd. Sp. Pl., 4. p. 659.; Smith Eng. Fl., 4. p. 172.; Forbes in Sal. Wob., No. 37.; Hook. Br. Fl., ed. 3.
Synonyme. *S.* phylicifòlia β *Lin. Sp. Pl.*, 1442., Fl. Lapp., No. 350. t. 8. f. c. (*Smith* from *Herb. Lin.*), *Koch Comm.*, p. 41.
The Sexes. Smith has described both sexes in *Eng. Fl.*; the female from Lapland specimens: the male is figured in *Eng. Bot.* and *Sal. Wob.* The *S.* nigréscens *Schl.*, female, is figured in *Sal. Wob.*, as the female of *S.* nígricans *Smith.* It does not appear that the flowers of the female have been found wild in Britain. (*Hook. Br. Fl.*, ed. 2.)
Engravings. Lin. Fl. Lapp., t. 8. f. c.; Eng. Bot., t. 1213.; Sal. Wob., No. 37.; and our *fig.* 37. in p. 1611.

Spec. Char., &c. Leaves elliptic-lanceolate, acute, crenate; glabrous, with a downy rib above; glaucous beneath. Stamens 2, thrice the length of the hairy bractea. Ovary lanceolate, downy, on a short downy stalk. (*Smith Eng. Fl.*) The male plant is a native of Britain, in fens, osier grounds, woods, and thickets. The female plant in the Woburn collection is the *S.* nigréscens of Schleicher, which was introduced about 1825, or before. The male plant in the Woburn collection forms a large bushy shrub, scarcely attaining the height or form of a tree, with upright, round, stout, rather brittle branches, glabrous, except when young. The catkins appear in April, much earlier than the foliage; and those of the males, when full grown, are 1½ in. long. The leaves are from 1 in. to 1½ in. broad, and from 4 in. to 5 in. long. According to Smith, *S.* nígricans is of no use in the arts. There are plants at Woburn, Flitwick, Henfield, and Hackney.

■ 110. *S.* ANDERSONIA'NA Smith. Anderson's Willow, *or the Green Mountain Sallow.*

Identification. Smith Eng. Bot., 2343.; Rees's Cyclo., No. 123.; Eng. Fl., 4. p. 223.; Forbes in Sal. Wob., No. 109.; Hook. Br. Fl., ed. 3.
Synonyme. *S.* phylicifòlia var. *Koch Comm.*
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and in *Sal. Wob.*
Engravings. Eng. Bot., t. 2343.; Sal. Wob., 109.; and our *fig.* 109. in p. 1623.

Spec. Char., &c. Stem upright. Leaves elliptical, acute, finely notched, slightly downy, paler beneath. Stipules half-ovate, nearly glabrous. Branches minutely downy. Ovary glabrous; its stalks almost equal to the bractea.

Style cloven, longer than the cloven stigmas. (*Smith Eng. Fl.*) A native of Scotland, on the Breadalbane Mountains; and England, on the banks of the Tyne below Newcastle. Stem bushy; its branches, which are green the first summer, and afterwards of a sooty brown, are clothed with dense, short, curved down, which finally disappears from the older ones. Leaves of a rich bright green, blackish when dried, from 1 in to 1½ in. long, broadly elliptical, acute, scarcely pointed, flat, finely crenate, or copiously and bluntly serrated; paler, but not glaucous, underneath; more or less downy on both sides, especially the midrib and veins, with minute hairs, their substance thin and pliant; the very young ones silky. Footstalks downy, and rather short. Catkins of ripe capsules not above 1 in. long. (*Ibid.*) There are plants at Woburn, Flitwick, Henfield, and Hackney.

Varieties. Mr. Forbes states that he has three varieties of *S.* Andersoniàna, in one of which the catkins are much shorter, and the capsules more loosely set on the rachis, or axis, of the catkin, than in the one figured in the *Salictum Woburnense.* (*Sal. Wob.*)

■ 111. *S.* DAMASCÈNA *Forbes.* The Damson-*leaved* Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 157.; Bor. in Eng. Bot. Suppl., t. 2709.; Hook. Br. Fl., ed. 3.
Synonymes. S. damascenifòlia Anderson MSS.; *S. phylicifòlia Lin.*, a state of, *Lindl. Synops. Br. Fl.*, p. 234.
The Sexes. The female is described in *Sal. Wob.*, and described in *Eng. Bot. Suppl.* "Mr. Anderson possessed both sexes, but we have seen the female only." (*Borrer.*)
Engraving. Eng. Bot. Suppl., t. 2709.

Spec. Char., &c. Upright. Young shoots densely hairy. Leaves ovate, or rhomboidal, bluntly toothed; silky when young; at length nearly glabrous; green on both surfaces. Stipules half-heart-shaped. Catkins, with the flowers in blossom, longer than the floral leaves. Bracteas (scales) obovate. Ovary stalked, glabrous. Style divided, longer than the diverging stigmas. (*Borrer* in *Eng. Bot. Suppl.*) Perhaps too nearly allied to *S.* Andersoniàna to be properly regarded as a species. In that, the leaves, especially the lower ones, are more oblong, and their under side is not so absolutely devoid of a glaucous tinge; the catkins are shorter, and rarely overtop the larger, and generally leaf-like, bracteas of the catkin. The flowers, except that they are more loosely set, and their bracteas (scales) more oblong and blacker, are very nearly the same in structure. If the footstalk of the germen is sometimes naked (a state which we have not seen), it is usually hairy. (*Ibid.*) The late Mr. G. Anderson communicated to Mr. Borrer, in 1813, under the manuscript name of *S. d*amascenifòlia, the *S. d*amascèna *Forbes*, as a species obtained from the south of Scotland and the borders, that he had cultivated for five years. The flowers appear with the young leaves, about the middle of April. The plant is a very upright shrub, about 12 ft. high. The following description is quoted from Mr. Forbes:—"Stem and branches erect, of a dark brown mahogany colour, copiously marked with small yellow spots; round and brittle. The leaves are from 1 in. to 1½ in. long, and rather more than ½ in. in breadth, of an elliptic figure, bluntly serrated; the serratures furnished with glands towards the points of the leaf; deep green and shining above, reticulated and glabrous beneath; the prominent arched veins only besprinkled with a few long hairs; the young leaves hairy, but ultimately losing their pubescence and their glaucous hue. Footstalks long, slender, downy on both sides, and brown. The leaves and young twigs of this species very much resemble those of the damson plum, and of *S.* Andersoniàna. There are plants at Henfield.

■ 112. *S.* ANSONIÀNA Forbes. Anson's *Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 107.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 107.; and our *fig.* 107. in p. 1622.

Spec. Char., &c. Leaves elliptic, acute, bluntly and deeply serrated, glabrous; bright green and shining above; beneath, glaucous and besprinkled with minute appressed hairs. Stipules large, rounded, serrated, glabrous. Ovary

ovate-lanceolate, slightly downy. Style thick, glabrous, twice the length of the parted stigmas. (*Sal. Wob.*, p. 213.) A native of Switzerland. Introduced in ? 1824, and flowering, in the willow garden at Woburn Abbey, in March and April. A spreading bushy shrub, producing long, dark, mahogany-coloured branches, which are glabrous and shining after the first year; the younger ones reddish brown and pubescent. Leaves from 1 in. to 1½ in. long, bluntly and deeply serrated, sometimes a little wavy and unequal at the base; green and shining above, glaucous and hairy beneath, but ultimately becoming nearly glabrous on both sides: the young leaves are very hairy when first expanded. Footstalks ¼ in. long, brown and downy. Catkins appearing before the expansion of the leaves. This species, Mr. Forbes observes, is a very remarkable one. Its very dark mahogany-coloured branches, which are of a deeper hue than even those of *S.* bícolor and *S.* nígricans, readily distinguish it from any other species. There are plants at Henfield.

♣ 113. *S.* HELVE'TICA *Forbes.* The Swiss Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 159.
The Sexes. The female is described in *Sal. Wob.*

Spec. Char., &c. Leaves ovate, acute, serrated; green, shining, and silky above; glaucous and hairy underneath. Stipules large, half-heart-shaped, serrated. Catkins often recurved, about 1 in. in length. Ovary ovate, silky, stalked. Style divided. Stigmas notched. (*Sal. Wob.*, p. 287.) A native of Switzerland. Introduced in 1824, and flowering in April, and again in August, in the willow garden at Woburn Abbey. This is a bushy tree, somewhat resembling *S.* Andersoniána in form of leaves and mode of growth. In the Woburn salictum, it grows to about 14 ft. high, with greenish brown, round, villous branches, which are copiously marked with yellow dots. Leaves from 1½ in. to nearly 2 in. long, and about 1½ in. in breadth; ovate, acute, sometimes hollowed out at the base, finely serrated; green and shining above; glaucous, and besprinkled with minute hairs underneath. Footstalks above ½ in. long, villous, like the midrib. A very distinct species.

♣ 114. *S.* FI'RMA *Forbes.* The firm-*leaved Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 106.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 106.; and our *fig.* 106. in p. 1622.

Spec. Char., &c. Leaves elliptic, obtuse, serrated, unequal at the base; green, shining, and villous above; glaucous and minutely hairy beneath. Stipules large, rounded, glabrous. Catkins above 1 in. long, nearly sessile. Ovary ovate-lanceolate, nearly glabrous. Style longer than the parted stigmas. (*Sal. Wob.*, p. 211.) A straggling bushy shrub, flowering, in the willow garden at Woburn Abbey, in March or April, and again in August; with dark brown glabrous branches, much resembling *S.* dùra in colour and mode of growth; but the leaves are very different in shape, being elliptical, broader above the middle, and furnished with shallow serratures: in their surfaces they have no material difference. Leaves about 2 in. long; often obtuse and unequal at the base; green, shining, and somewhat villous above; glaucous and besprinkled with minute hairs beneath; both surfaces becoming nearly glabrous. Footstalks about 1 in. long, pubescent, reddish. Twigs and branches very brittle. There are plants in the Goldworth and Hackney arboretums.

♣ 115. *S.* CARPINIFO'LIA *Schl.* The Hornbeam-leaved *Sallow, or* Willow.

Identification. ? Schleicher, as quoted in Hort. Brit., No. 24078.; Forbes in Sal. Wob., No. 155.
Synonyme. *S.* phylicifòlia var. *Koch Comm.*, p. 42.
The Sexes. The female is described in *Sal. Wob.*

Spec. Char., &c. Leaves ovate, acute, unequal, and a little heart-shaped at the

base; the margins deeply serrated, and furnished with glands, a little wavy; upper surface shining and downy; under one glaucous, and besprinkled with small appressed hairs. Ovary ovate-subulate, glabrous. Style longer than the divided stigmas. (*Sal. Wob.*, p. 283.) A native of Germany. Introduced in 1824, and flowering in March and April. A small bushy tree, with round villous branches, of a sooty brown colour. Buds hairy. Leaves from 1 in. to 1½ in. long, of an ovate shape, deeply serrated, and somewhat wavy; unequal, and a little heart-shaped at the base; more or less downy on both sides, especially the midrib and veins, with minute hairs; beneath, glaucous. Footstalks downy. Catkins 1 in. long. This species resembles, in leaves and mode of growth, *S.* rotundàta; but is a very distinct kind, having the leaves more oblong and undulated. There are plants at Woburn, and in the Hackney arboretum.

♠ ⚘ 116. *S.* ROTUNDA'TA *Forbes.* The round-*leaved* Willow, *or Sallow.*

Identification. Sal. Wob., No. 104.
Synonyme. ? *S.* rotundifòlia *Host.*
The Sexes. Both sexes are described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 104.; our *fig.* 1357. in p. 1572.; and *fig.* 104. in p. 1621.

Spec. Char., &c. Leaves orbicular, bluntly serrated; glabrous and shining above; glaucous, reticulated, and slightly hairy beneath. Stipules rounded, serrated, glandular. Ovary awl-shaped, glabrous, stalked. Style twice the length of the parted stigmas. (*Sal. Wob.*, p. 207.) A native of Switzerland. Introduced in ?1824, and flowering, in the willow garden at Woburn Abbey, in April and May. An upright-growing shrub or low tree, attaining the height of 15 ft. or more; the preceding year's branches of a brownish green colour, marked with several yellow spots, and retaining their pubescence; very brittle; the young twigs round, densely hairy, and copiously covered with leaves. Leaves orbicular, somewhat heart-shaped at the base when fully grown, bluntly serrated; glabrous and shining above; glaucous, reticulated, and very minutely hairy beneath, becoming almost glabrous when at maturity. Footstalks stout, and densely downy. Catkins of the male nearly 1 in. long. The roundness of the leaves renders this a very distinct species. There are plants at Woburn, Henfield, and Goldworth.

⚘ 117. *S.* DU'RA *Forbes.* The hardy *Sallow, or* Willow.

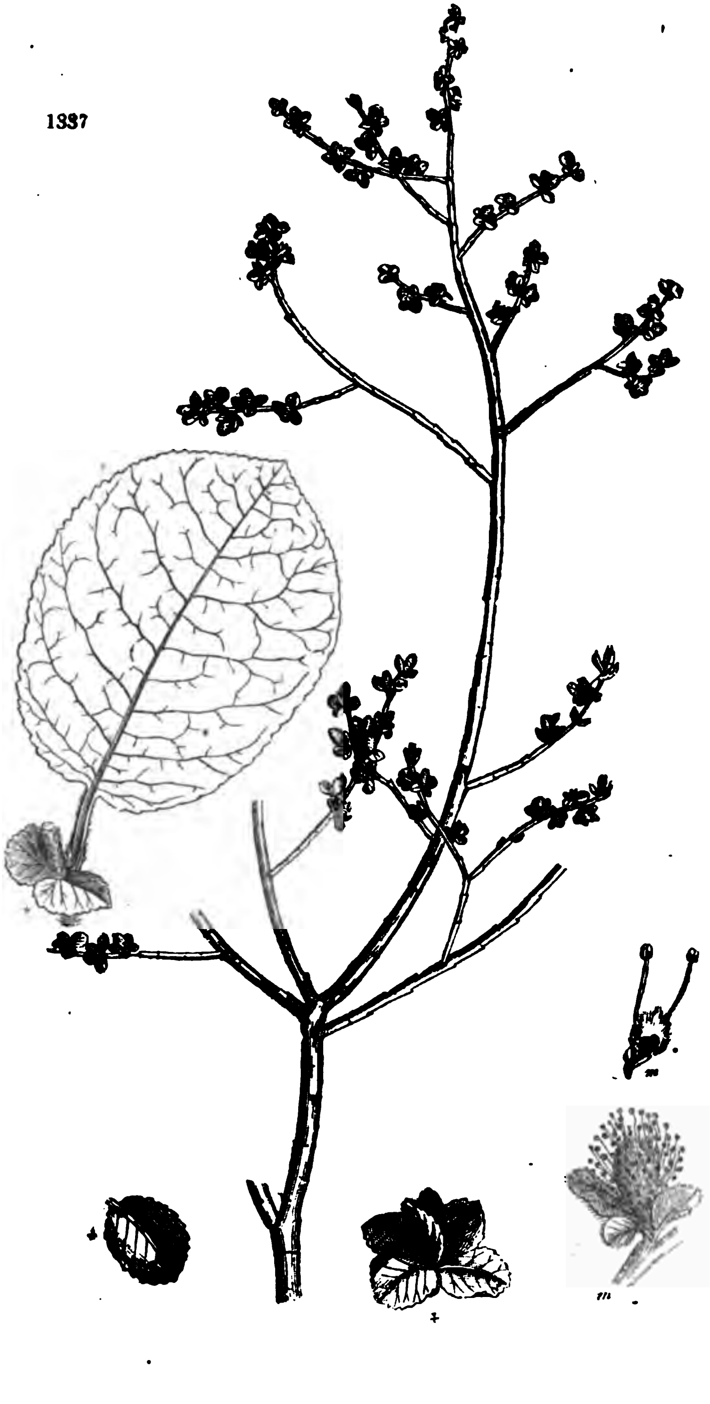
Identification. Forbes in Sal. Wob., No. 105.
The Sexes. The male plant is figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 105.; and our *fig.* 105. in p. 1622.

Spec. Char., &c. Leaves elliptical, deeply toothed, a little heart-shaped at the base; green, shining, and villous above; glaucous and pubescent beneath. Stipules large, rounded, glabrous. Catkins short. Bracteas yellow, fringed. (*Sal. Wob.*, p. 209.) A rapid-growing tree, flowering, in the willow garden at Woburn Abbey, in April and May; with dark brown, glabrous, round branches; the young ones reddish, and thickly covered with short white hairs, which disappear towards autumn; forming a bushy head, with long oblique twigs. The leaves are nearly 2 in. long, and 1½ in. in breadth; of an elliptical-roundish shape, obtuse and somewhat heart-shaped at the base, with blunt oblique points; green, villous, and shining above; glaucous and pubescent beneath, becoming nearly glabrous in autumn; their margins deeply toothed, the teeth furnished with glands, which are very conspicuous in the young leaves. Footstalks rather short, stout, and downy. Catkins about ½ in. long. A very distinct species; and, though of very rapid and vigorous growth, unfit, from the brittleness of its branches, for basketwork. There are plants at Woburn, Henfield, and Flitwick, and also in the Hackney and Goldworth arboretums.

♠ ⚘ 118. *S.* FORSTERIA'NA Smith. *The glaucous Mountain Sallow, or* Forster's Willow.

Identification. Smith Eng. Bot., t. 2344.; Rees's Cyclo., No. 124.; Smith Eng. Fl., 2. p. 224.; Forbes in Sal. Wob., No. 110.; Hook. Br. Fl., ed. 3., p. 431.

1337



Synonyme. S. phylicifòlia var. *Koch Comm.*, p. 41.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.*, where the style is represented too short (*Smith Eng. Fl.*), and in *Sal. Wob.*
Engravings. Eng. Bot., t. 2344.; Sal. Wob., No. 110.; and our *fig.* 110. in p. 1623.

Spec. Char., &c. Stem erect. Branches minutely downy. Leaves elliptic-obovate, acute, crenate, slightly downy, glaucous beneath. Stipules vaulted. Ovary stalked, awl-shaped, silky. Style as long as the blunt notched stigmas. (*Smith Eng. Fl.*) A native of Britain, in Scotland, on the Breadalbane Mountains; and flowering in May. Taller than S. Andersoni*àna*, and forming a small tree, with finely downy branches. Leaves larger and firmer than those of *S.* Andersoni*àna*; their upper surface of a darker or duller green, though more polished, scarcely downy, except the midrib and veins; glaucous beneath, and finely veiny, with more downiness; their length 2 in. or 3 in.; the margin crenate, rather serrated; the young ones very densely silky, in the manner of the foregoing. Footstalks downy. Catkins of the female 1 in. long when in full bloom, and more than twice as much when the seeds are ripe. (*Ibid.*) In the Woburn collection there are three varieties of this species. The one described drops its leaves much earlier than either *S.* Andersoni*àna* or *S.* rupéstris, and is, according to Mr. Forbes, quite distinct. There are plants at Woburn and Henfield; also in the Goldworth and Hackney arboretums.

✱ 119. *S.* RUPE'STRIS *Donn.* The *silky* Rock Willow, *or Sallow.*

Identification. Donn Hort. Cant., ed. 5., p. 231. (*Smith*); Eng. Bot., t. 2342.; Rees's Cyclo., No. 123.; Smith Eng. Fl., 4. p. 222.; Forbes in Sal. Wob., No. 111.; Hook. Br. Fl., ed. 3.
The Sexes. Both sexes are described in *Eng. Fl.*, and figured in *Eng. Bot.*, and in *Sal. Wob.*
Engravings. Eng. Bot., t. 2342.; Sal. Wob., No. 111.; and our *fig.* 111. in p. 431.

Spec. Char., &c. Stem trailing. Leaves obovate, acute, serrated, flat, even, silky on both sides. Stipules hairy. Branches minutely downy. Ovary stalked, awl-shaped, silky. Style as long as the blunt undivided stigmas. (*Smith Eng. Fl.*) A native of Scotland, in woods and on the banks of rivers; and flowering in April. Stems trailing or depressed, with dark-coloured branches, covered with very fine down when young. Leaves about 1 in. long, obovate or elliptical, acute, even and flat, veiny, but not wrinkled; finely and regularly serrated, beautifully silky with depressed hairs; more especially beneath, and when young. Footstalks downy, in the manner of the branches. Catkins appearing rather before the leaves, ½ in. long; those of the female soon becoming thrice that length, and more lax. A perfectly distinct kind. The branches are tough, and suitable for tying and basket-work. There are plants at Woburn, Henfield, and Flitwick; and also in the Hackney and Goldworth arboretums.

■ 120. *S.* TENUIFO'LIA *L.* The thin-leaved Willow.

Identification. Lin. Fl. Lapp., ed. 2., 292. t. 8. f. c. (*Smith.*) The figure in that work represents only a floral leaf, and that unlike any that we have seen in our plant. (*Borrer* in *Eng. Bot. Suppl.*) Smith Fl. Br., p. 1052.; Eng. Fl., 4. p. 179.; exclusively of the synonyme of Eng. Bot., t. 2186.; Forbes in Sal. Wob., No. 50.; Hook. Br. Fl., ed. 3.; Borr. in Eng. Bot. Suppl., t. 2795.
Synonymes. *S.* arbúscula *Wahlenb.* var. *Koch Comm.*, p. 45. "If Koch had known *S.* tenuifòlia *Smith Fl. Br.* in the living plant, I think he would have referred it to his own *S.* phylicifòlia." (*Borrer* in a letter.) *S.* tenuifòlia of *Eng. Bot.*, t. 2186., is *S* bicolor *Hook. Br. Fl.*
The Sexes. Both sexes are described and figured in *Eng. Bot. Suppl.*, and figured in *Sal. Wob.*
Engravings. Lin. Fl. Lapp., ed. 2., t. 8. f. c.; Sal. Wob., No. 50.; Eng. Bot. Suppl., t. 2795.; and our *fig.* 50. in p. 1614.

Spec. Char., &c. Upright. Young shoots and petioles densely pubescent. Disks of leaves elliptical or oblong, flat, with a recurved point, crenate, reticulated with sunken veins, slightly hairy; glaucous beneath. Stipules half-heart-shaped. Catkins on a short stalk that bears small leaves. Bractea oblong, shaggy. Ovary glabrous, on a glabrous stalk. Style as long as the stigmas. A link between the *Sálices* nigricántes and *Sálices* bicolòres of *Hook. Br. Fl.*, most allied, perhaps, to the former; and, indeed, so nearly to *S.* rupéstris, that we cannot undertake to point out satisfactory distinctions. (*Borrer* in *E. B. Suppl.*) A native of England, above the bridge at Kirkby Lonsdale. The following are some of the features of the kind, as it is described by Mr. Borrer:— "A much-branched spreading shrub, 10 ft. or 12 ft. high. Twigs very downy

when young, afterwards glabrous, or nearly so, and shining, green, or tinged, especially in the female, with brown. Petioles downy, spreading, rather long. Leaves by no means remarkably thin; ovate or more or less rhomboid, and having a short, decurved, somewhat twisted point; on strong young shoots more oblong; dark green above and moderately shining; glaucous beneath; sprinkled, when young, on both surfaces with appressed hairs, some of which remain in the advanced state; veins sunken on the upper surface, very prominent on the under one; margin rather closely serrate, or rather crenate, especially about the middle of the leaf, with a glandular tooth in the notches. Stipules small, except on very vigorous shoots, half-heart-shaped, pointed, serrated, beset with glands on the edges and on the lower part of the disk. Catkins appearing in May, before the expansion of the leaves; cylindrical, about 1 in. long when in full flower. Flowers closely imbricated. Stamens thrice as long as the bractea." There are plants at Woburn, Henfield, and Flitwick, and also in the Goldworth Arboretum.

? *Variety*. Mr. Borrer states that he has, in his collection at Henfield, from the same locality as the species, what seems a variety of it; having silky hairs on the upper half of the ovary and towards the base of its stalk. This is, perhaps, the plant mentioned in the *Flora Britannica*, as deserving further investigation. (*Borrer* in *Eng. Bot. Suppl.*)

♠ ♀ 121. *S.* PROPI'NQUA *Borr.* The nearly related, *or flat-leaved, upright, Mountain* Willow.

Identification. Borr. in Eng. Bot. Suppl., t. 2729.; Hook. Br. Fl., ed. 3.
The Sexes. The female is described in the *Specific Character*; and described and figured in *Eng. Bot. Suppl.*
Engraving. Eng. Bot. Suppl., t. 2729.

Spec. Char., &c. Upright. Young shoots pubescent with minute down. Leaves elliptical, obscurely crenate, nearly flat, nearly glabrous on both surfaces; veins slightly sunken; under surface pale green. Stipules small, vaulted, glanded. Ovaries stalked, silky towards the point. Style longer than the notched stigmas. (*Borrer* in *Eng. Bot. Suppl.*) Finding in this some apparently distinctive characters, we venture, after much hesitation, to add another presumed species to a section of the genus, of which almost every species is doubtful. It was discovered in Britain by Mr. Anderson, and we know it only from plants received from him. Planted by the side of *S.* petræ'a, it has attained, in the same period, scarcely half the height of that. (*Ibid.*) *S.* petræ'a is, in some instances, more than 15 ft. high. There are plants at Henfield, and in the Goldworth Arboretum.

♠ 122. *S.* PETRÆ'A *Anders.* The Rock *Sallow, or* Willow.

Identification. First distinguished by Mr. G. Anderson, who is understood to have given to it the name of *S.* petræ'a. (*Borrer* in *Eng. Bot. Suppl.*) Forbes in Sal. Wob., No. 97.; Borrer in Eng. Bot. Suppl., t. 2725.; Hook. Br. Fl., ed. 3.
Synonymes. *S.* arbúscula *Wahlenb.*, *Koch Comm.*, p. 45., where Koch has remarked that he has thus adjudged the *S.* petræ'a *Anderson* from a specimen derived from Anderson. "It is surely by error that Koch has placed *S.* petræ'a under his *S.* arbúscula, with *S.* phylicifòlia *Smith*, and not under his own *S.* phylicifòlia, with *S.* Ammanniàna and its allies." (*Borrer* in *Eng. Bot. Suppl.*) If Koch had known the *S.* petræ'a in the living plant, I believe that he would have referred it to his own *S.* phylicifòlia. (*Borrer* in a letter.)
The Sexes. The female is described and figured in *Eng. Bot. Suppl.*, and in *Sal. Wob.*
Engravings. Sal. Wob., No. 97.; Eng. Bot. Suppl., t. 2725.; and our *fig.* 97. in p. 1620.

Spec. Char., &c. Upright. Young shoots densely hairy. Leaves oblong, serrated, carinate, twisted, reticulated with deeply sunken veins; beneath, hairy, glaucous, at length pale green. Stipules large, half-heart-shaped, flattish, having few glands. Ovary stalked, naked, wrinkled towards the point. Style divided, longer than the cloven stigmas. *S.* petræ'a is nearly allied to *S.* hírta *Smith Eng. Bot.*, t. 1404.; and still more nearly, perhaps, to *S.* stylàris of Seringe *Monogr. des Saules de la Suisse*, p. 62. (*Borr.* in *Eng. Bot. Suppl.*) A British kind of willow, first distinguished by the late Mr. G. Anderson, who communicated the plants from which our figure was drawn. We have wild specimens from the mountains of Breadalbane. The kind is a shrub, in some instances upwards of 15 ft. high, with crooked ash-coloured

branches and brown twigs. Young shoots covered with short, horizontal, or deflexed hairs. Leaves on the upper surface slightly hairy, very dark green and shining; on the under one, bluish, and rather more hairy, or woolly; at length glabrous on both surfaces, except on the petiole and midrib, and losing, or very nearly losing, the glaucous tinge on the under one; the edges slightly recurved, serrated throughout with blunt gland-tipped teeth. Stipules remarkably large, serrated, having glands at the edge, and a few on the disk, near the point of insertion. The kind is remarkable for the long, dark, shining, wavy leaves, and large stipules, of its strong shoots. The flowers come forth with the young leaves about the beginning of May. Catkin, in the earliest state of flowering, ovate, and usually less than ½ in. long; but it gradually becomes cylindrical, and 3 or 4 times as long. (*Ibid.*) There are plants at Woburn, Henfield, and Flitwick.

♀ 123. *S.* AMMANNIA'NA Willd. Ammann's Willow.

Identification. Willd. Sp. Pl., 4. p. 663.; Smith in Rees's Cyclo., No. 21.
Synonymes. *S.* phylicifolia var. *Koch Comm.*, p. 41.; *S. Myrsinites Hoff. Sal.*, 1. p. 71. t. 17, 18, 19. and 24. f. 2. (*Smith* in *Rees's Cyclo.*) "*S.* stylàris *Seringe Monogr. des Saules de la Suisse*, p. 62., is regarded as *S.* Ammanniàna Willd. (*Borrer*, incidentally in *Eng. Bot. Suppl.*, t. 2725.)
The Sexes. The female is noticed in the *Specific Character.*
Engravings. Hoffm. Sal., 1. p. 71. t. 17, 18, 19. and 24. f. 2. (*Smith.*)

Spec. Char., &c. Leaves oblong-elliptical, acute, serrate, glabrous; glaucous beneath. Petiole long, downy. Stipules ovate, dentate, persistent. Catkins protruded before the leaves. Ovaries lanceolate, glabrous. (*Willd.*) Wild in the alps of Salzburg and Carinthia. (*Id.* and *Smith.*) Introduced in 1821.

124. *S.* ATROVI'RENS *Forbes.* The dark-green *Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 108.
The Sexes. Both sexes are described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 108.; and our *fig.* 108. in p. 1622.

Spec. Char., &c. Leaves ovate-acute, bluntly serrated, nearly glabrous, heart-shaped at the base. Footstalks rather short, downy. Stipules large, rounded, serrated. Ovary awl-shaped, on a short stalk, downy. Style glabrous, longer than the parted stigmas. (*Sal. Wob.*, p. 215.) A native of Switzerland. Introduced in 1824, and flowering, in the willow garden at Woburn Abbey, in May. An upright shrub or tree, attaining the height of 10 ft. or 12 ft. Branches dark brown, round, downy, and slightly striated. Leaves above 2 in. long, 1½ in. broad, of an ovate-heart-shaped figure, slightly hairy; glaucous beneath, with a downy midrib and prominent arched veins; margins bluntly serrated. Footstalks short. Catkins of the male rather more than ½ in. long, and appearing with the leaves. A very distinct species, and easily distinguished by its dark green leaves, which are generally heart-shaped at the base.

125. *S.* STRE'PIDA *Forbes.* The creaking Willow, *or Sallow.*

Identification. Sal. Wob., No. 100.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 100.; and our *fig.* 100. in p. 1621.

Spec. Char., &c. Leaves obovate-elliptical, acute, pubescent, glaucous beneath; margins denticulated; the tip oblique. Stipules half-heart-shaped, serrated, and glabrous. Catkins oblong. Capsules awl-shaped, silky. Style long. Stigmas bifid. (*Sal. Wob.*, p. 199.) A native of Switzerland. Introduced in 1820, and flowering in March and April. This plant forms a straggling bush, producing rather long pendulous branches, of a pale greenish colour, very pubescent, and soft to the touch; perfectly round. Buds of a purplish colour, and hairy. Leaves about 2 in. long, and broadest about the middle; the tip oblique, acute, and nearly entire; margins dentated, or slightly serrated; the lower serratures, in some of the leaves, sometimes elongated; upper surface of a dull green, pubescent; under surface glaucous, hairy, with a pale, prominent, and downy midrib. Footstalks rather short, sometimes tinged with red. Catkins of the female 1 in. long. The shoots unfit for

basketwork. There are plants at Woburn, and in the Goldworth and Hackney arboretums.

■ 126. *S.* SO'RDIDA *Forbes.* The sordid *Sallow, or* Willow.

Identification. Forbes in Sal. Wob., No. 101.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 101.; and our *fig.* 101. in p. 1621.

Spec. Char., &c. Leaves lanceolate, serrated, pubescent, and glaucous beneath. Stipules rounded, toothed, glandular. Catkins numerous, recurved. Filaments whitish. Anthers yellow. Bractea obovate, slightly fringed. (*Sal. Wob.*, p. 201. A native of Switzerland. Introduced in ? 1824; flowering, in the willow garden at Woburn Abbey, in April. It is a bushy, upright-growing shrub, with yellow, round, pubescent branches, which are variously marked with small black spots. Buds yellow, rather longer than in *S.* strépida. (*Forbes.*) Leaves from 2 in. to 2½ in. long, and about 1 in. broad, of an elliptic-lanceolate shape, remotely serrated, the serratures furnished with glands; upper surface pubescent, but ultimately becoming nearly glabrous; glaucous beneath, with a densely pubescent midrib. Footstalks nearly ¼ in. long, slender. Catkins appearing before the leaves; all inclining towards one side of the branch; very numerous. The twigs are brittle, and unfit for basketwork. These are plants at Woburn, Flitwick, Henfield, and Hackney.

■ 127. *S.* SCHLEICHERIA'NA Forbes. Schleicher's Willow, *or Sallow.*

Identification. Sal. Wob., No. 98.
The Sexes. The female is described in *Sal. Wob.*
Engravings. Sal. Wob., No. 98.; and our *fig.* 98. in p. 1620.

Spec. Char., &c. Leaves elliptic, acute, serrated, dark green; villous above, glaucous and pubescent beneath. Germens awl-shaped, glabrous, stalked. Style twice as long as the undivided ovate stigmas. Stipules half-ovate, serrated. (*Sal. Wob.*, p. 195.) A native of Switzerland. Introduced in 1824; flowering in April and May. This species forms a very bushy head, attaining the height of 12 ft. or 15 ft., spreading obliquely, with round dark brown branches, copiously covered with a sort of pubescence when young, which continues, to a certain degree, on the preceding year's shoots. Leaves from 1½ in. to 2 in. long, elliptic, acute; shining and villous on their upper surface; glaucous and hairy beneath; often contracted at the base; the young ones densely covered with long silky hairs, but losing their pubescence as they advance in age, and ultimately becoming almost glabrous. Footstalks slender, about ¼ in. long. Catkins from 1½ in. to 2 in. long, expanding with the leaves. There are plants at Woburn and Henfield; and also in the Goldworth and Hackney arboretums.

■ 128. *S.* GRISONE'NSIS *Forbes.* The Grisons *Sallow, or* Willow.

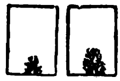
Identification. Forbes in Sal. Wob., No. 99.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 99.; and our *fig.* 99. in p. 1620.

Spec. Char., &c. Leaves elliptic-lanceolate, acuminate, glabrous; deep green, shining above; paler glaucous beneath. Stipules half-heart-shaped, toothed, glabrous. Ovary ovate-lanceolate, somewhat downy, on a short stalk. Style glabrous, longer than the cloven stigmas. (*Sal. Wob.*, p. 197.) A native of the Grisons. Introduced in ? 1824, and flowering, in the willow garden at Woburn Abbey, in March and April. A shrub, much resembling *S.* Schleicheriàna in size and mode of growth; but the leaves are much longer, and likewise the catkins, by which it is readily distinguished from that species. The branches are brownish green, glabrous, and shining, after the first year; young ones reddish brown, pubescent, but becoming glabrous in autumn. Leaves from 2 in. to 3 in. long, elliptic-lanceolate; their breadth 1 in. or more; deep green, glabrous, and shining on their upper surface; glaucous and paler beneath; pubescent in their young state; their margins furnished with shallow serratures, entire towards their extremities. Footstalks ½ in. or

more in length, downy. Catkins from 2 in. to 3 in. long when matured. The branches are brittle, and apt to break when used for tying. There are plants at Woburn, Henfield, and Flitwick.

Group xviii. *Bicolòres* Borrer.

Bushy Shrubs, with Leaves dark green above, and glaucous beneath.



Stamens 2 to a flower. Ovaries silky. Leaves between obovate and lanceolate, glabrous, or nearly so; dark green on the upper surface, very glaucous on the under one. Plants twiggy bushes. (*Hook. Br. Fl.*, ed. 2., adapted.) Koch has included under one species, to which he has applied the name *S.* arbúscula *Wahlenberg*, several of the species or kinds of this group. The constituents of this species are as follows: — As synonymes, *S.* arbúscula *Wahlenb. Fl. Lapp.*, No. 476., *Fl. Suec.*, No. 1122.; *S.* arbúscula *a Lin. Suec.*, No. 386., *Sp. Pl.*, p. 1445., not of Smith, nor Vahl, nor Jacq. — As varieties, *Lin. Fl. Lapp.*, t. 8. f. c.; *S.* phylicifòlia *Smith Fl. Brit.*; *S.* radìcans *Smith Fl. Brit.*; *S.* tétrapla *Walker*; *S.* hùmilis *Willd. Berl. Baumz.*; *S.* Dicksoni*àna* Smith; *S.* Weigeli*àna* Willd. Sp. Pl., p. 678.; *S. la*úrina *Smith*; *S.* majàlis *Wahlenb. Fl. Lapp.*, p. 270.; *S.* tenuifòlia *Smith Fl. Brit.*; *S.* petræ'a *Anderson*; *S.* Crowe*àna* Smith. Dr. Lindley, in his *Synopsis of the British Flora*, has added to these the following kinds, elucidated by *Borrer* in *Eng. Bot. Suppl.*, and treated as species below: — *S.* laxiflòra *Borrer*; *S.* phillyreifòlia *Borrer*; *S.* propínqua *Borrer*; *S.* Weigeli*àna* Borrer; *S.* nìtens *Smith*; *S.* tenùior Borrer. In the part of the prefatory matter of the group Nigricántes relating to *S.* phylicifòlia *Koch*, some information on the above *S.* arbúscula *Koch* is incidentally given.

■ 129. *S.* TENU'IOR *Borrer*. The narrower-*leaved intermediate* Willow.

Identification. Borrer in Eng. Bot. Suppl., t. 2650.; Hook. Br. Fl., ed. 2., p. 425.
Synonymes. Specimens were communicated to Smith, who appears to have united this kind with the *S. la*úrina *Smith*, the *S.* bicolor *Smith Eng. Bot.*, t. 1806. (*Borrer.*)
The Sexes. The female is described and figured in *Eng. Bot. Suppl.*; the male is not known.
Engraving. Eng. Bot. Suppl., t. 2650.

Spec. Char., &c. Disk of leaf obovate-lanceolate, acute, obsoletely crenate, flat; glabrous on both surfaces, glaucous on the under one. Petiole slender. Stipules acute, glandulose. Catkin slender. Flowers laxly disposed in the catkin. Bracteas (scales) acute, longer than the silky stalk of the capsule. Style longer than the ovate stigmas (*Borrer.*) Found by the river Lochy, near Killin, in Breadalbane. The specimens figured were taken from a plant brought thence in 1810. An upright shrub, 15 ft. or more high. Branches loosely spreading. Disk of leaves about 2 in. long, when first unfolded, sprinkled with appressed hairs on both surfaces, but soon becoming glabrous except the midrib; upper surface dark green and shining. Petiole long, pale, downy. The flowers appear, with Mr. Borrer, earlier than the leaves, about the beginning of May. Catkin about 1 in. long, while the flowers are in blossom; eventually about 2 in. Mr. Borrer has indicated its affinity as follows: — Very near *S. la*úrina *Smith*; and, like it, intermediate between the common sallows and the glabrous bright-leaved affinities of *S.* phylicifòlia; resembling some of the former more nearly in general habit and in the shape of the leaves; the latter, in the deciduous nature of the pubescence, and in the glandulose stipules. *S.* nígricans angustifòlia *Seringe Saules de la Suisse*, No. 22.: it is very similar to *S.* tenùior *Borrer*. There are plants at Henfield, and in the Goldworth Arboretum.

• 130. *S.* LAXIFLO'RA *Borr.* The loose-catkined Willow.

Identification. Borr. in Eng. Bot. Suppl., t. 2749.; Hook. Br. Fl., ed. 3.
The Sexes. The female is described and figured in *Eng. Bot. Suppl.* The male plant is not known.
Engraving. Eng. Bot. Suppl., t. 2749.

Spec. Char., &c. Upright. Young shoots slightly pubescent. Leaves glabrous, flat, broadly obovate, narrower to the base, slightly toothed, glaucescent beneath; upper leaves acute. Stipules small, concave Flowers loosely disposed in the catkin. Ovary stalked, bluntish, glabrous in the lower part. Style as long as the linear divided stigmas. (*Borrer* in *E. B. Suppl.*) Wild at Killin, in Breadalbane, where it was observed in 1810. Mr. G. Anderson had previously distinguished it, and communicated to Mr. Borrer the plant from which the specimens figured were taken, but without informing Mr. Borrer in what part of Britain he had found the kind. That plant has formed a tree-like shrub, more than 12 ft. high, with crooked, divaricated branches, and flowers in April. The twigs are shining, greenish grey or slightly tinged with brown; at first, sparingly and inconspicuously pubescent. Leaves 1 in. to 1½ in. long; bright green and shining above, more or less glaucous beneath. Catkin about 1 in. long when the flowers are in blossom, which are loosely set in the catkin. It flowers in April. It resembles *S. laúrina* in the figure of the leaves; but that kind differs in its more acutely angled ramification; its mahogany-coloured twigs, densely cottony while young; the abundance of short appressed hairs present on both surfaces of the young leaves; the more awl-shaped ovary, white all over with cottony hairs; and the shorter style, with short stigmas, the segments of which usually adhere together. (*Borrer* in *E. B. Suppl.*; *Hook. Br. Fl.*, ed. 3.)

♀ 131. *S.* LAU'RINA *Smith.* The Laurel-*leaved, or shining dark green,* Willow.

Identification. Smith Lin. Soc. Trans., 6. p. 122.; Hook. Br. Fl., ed. 2., p. 425.
Synonymes. *S.* bicolor *Smith Eng. Bot.*, t. 1806., *Eng. F.*, 4. p. 178., *Forbes* in *Sal. Wob.*, No. 38.; *S.* arbúscula *Wahlenb.* var. *Koch Comm.*, p. 45.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1806.; Sal. Wob., t. 38.; our *fig.* 1338.; and *fig.* 38. in p. 1612.

Spec. Char., &c. Leaves elliptic-oblong, acute, waved, and slightly serrated, nearly glabrous; glaucous beneath. Footstalks dilated at the base. Stipules pointed, serrated. Bracteas obtuse, hairy, and half as long as the densely downy, ovate, long-stalked ovary. (*Smith Eng. Fl.*) A native of Britain, in various parts; growing plentifully in woods and thickets; flowering in March and April. A shrub or small tree. Branches at first erect, or wand-like, round, of a mahogany-colour, beset with copious nearly upright leaves, and attaining the height of 6 ft. Catkins earlier than the foliage. If neglected, the plant becomes a small tree. (*Smith.*) The twigs are very brittle, and unfit for any useful purpose. (*Forbes.*) There are plants at Woburn and Henfield; also in the Goldworth and Hackney arboretums.



1338

• 132. *S.* PA'TENS *Forbes.* The spreading-*branched* Willow.

Identification. Forbes in Sal. Wob., No. 39.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 39.; and our *fig.* 39. in p. 1612.

Spec. Char., &c. Stem spreading. Leaves elliptical, entire; glabrous, green and shining above; veiny, glabrous, and glaucous beneath. Stipules lanceolate, very minute, withering. Ovary sessile, ovate-lanceolate, silky. Style longer than the parted stigmas. (*Sal. Wob.*, p. 77.) The native country of this species is not given. It is a branching shrub, about 3 ft. or 4 ft. high, with short, spreading, dark brown branches, slightly villous only when in their youngest state. The leaves are 1 in. long; and sometimes 2 in. long, and 1 in. in breadth, on luxuriant shoots; much resembling those

of *S. lanrina*. The catkins appear with the leaves in May, and the plant produces them a second time in August. The general length of the young twigs is from 6 in. to 8 in.; but this species is not likely to be applicable to basket-making. There are plants at Woburn, Henfield, and Flitwick.

✣ 133. *S.* RADI`CANS *Smith.* The rooting-*branched* Willow.

Identification. Smith Fl. Brit., p. 1053.; Willd. Sp. Pl., 4. p. 676. (*Smith*); Hook. Br. Fl., ed. 2., p. 428.; Borrer in Eng. Bot. Suppl., t. 2701., in the text.
Synonymes. S. phylicifòlia *Lin. Fl. Lapp.*, No. 351., t. 8. f. d., *Smith Fl. Brit.*, p. 1049., *Eng. Bot.*, t. 1958., *Eng. Fl.*, 4. p. 173. "The original Lapland specimen of *S.* phylicifòlia in the Linnæan herbarium is indubitably, as was long since stated by Smith, the *S.* phylicifòlia of *Eng. Bot.*, t. 1958." (*Borrer* in *Eng. Bot. Suppl.*, t. 2709.) "As Linnæus no doubt included several other willows," besides the Lapland *S.* phylicifòlia noticed above, " under his *S.* phylicifòlia, it would be better to call " the kind of *Eng. Bot.* " by Smith's first name, radìcans." (*Borrer*, quoted in *Hook. Br. Fl.*, ed. 2.) *S.* phylicifòlia *Forbes* in *Sal. Wob.*, No. 46.; *S.* arbúscula *Wahlenb.* var. *Koch Comm.*, p. 44.
The Sexes. The female is described in *Eng. Fl.*, where Smith has noticed that he had not observed the catkins of the male. The female is figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1958.; Sal. Wob., No. 46.; and our *fig.* 46. in p. 1614.

Spec. Char., &c. Leaves elliptic-lanceolate, with wavy serratures, very glabrous; glaucous beneath. Stipules glandular on the inside. Ovary lanceolate, stalked, silky. Style twice the length of the stigmas. Branches trailing. (*Smith Eng. Fl.*) The following traits are also derived from Smith. A low, spreading, glabrous bush, whose long, recumbent, brown or purplish branches take root as they extend in every direction. Leaves on shortish stalks, not much spreading, about 2 in. long, not 1 in. broad; very acute at the point, not at all rounded at the base; glabrous at all times, except an obscure downiness on the midrib above; harsh to the touch, bitter, variously crenated or serrated; the serratures peculiarly, and sometimes very remarkably, undulated; the upper side of a dark shining green, and the under glaucous. "A perfectly distinct plant, in its low mode of growth, from *S.* Borreriàna and *S.* Davalliàna, and from all the other British species with which I am acquainted." (*Forbes.*) Mr. Borrer has described incidentally, at the end of his account of *S.* Davalliàna in the *Eng. Bot. Suppl.* t. 2701., characters of *S.* radìcans in contrast with characters of *S.* Davalliàna. One of these is, that *S.* radìcans flowers a full fortnight later than *S.* Davalliàna.

✣ 134. *S.* BORRERIA`NA Smith. Borrer's, *or the dark upright*, Willow.

Identification. Smith Eng. Fl., 4. p. 174.; Forbes in Sal. Wob., No. 45.; Borr. in Eng. Bot. Suppl., t. 2619.; Hook. Br. Fl., ed. 3.
The Sexes. The male is described in *Eng. Fl.* and *Eng. Bot. Suppl.*, and figured in *Sal. Wob.* and *Eng. Bot. Suppl.* Mr. W. Wilson and Sir W. J. Hooker have found the female at Killin, in Breadalbane. (*Hook. Br. Fl.*, ed. 2.)
Engravings. Sal. Wob., No. 45.; Eng. Bot. Suppl., t. 2619.; our *fig.* 1339.; and *fig.* 45. in p. 1614.

Spec. Char., &c. Branches erect. Leaves lanceolate, serrated with shallow nearly even serratures, very glabrous; glaucous beneath. Stipules lanceolate, small. Bracteas (scales) acute, shaggy. (*Smith E. F.*, *Borr. E. B. S.*) It is nearly allied to *S. phylicifòlia Eng. Bot.*, t. 1958.; but seems distinct, differing much in its mode of growth and habit, and its narrower and truly lanceolate leaves. (*Borr.*) Native to Scotland, in Highland mountain valleys: Breadalbane, Killin in Breadalbane, and Glen Nevis, are the localities mentioned. It was first discovered by Mr. Borrer, who has given a detailed description of it in *Eng. Bot. Suppl.*, from which the following traits are derived: — A much-branched shrub, decumbent at the base only, about 10 ft. high. Large branches ash-coloured. Twigs spreading or ascending, short, soon becoming of a deep mahogany hue, and glabrous.



1339

Buds large. Disk of the leaf lanceolate, tapering to each end, about 2 in. long, and ½ in. or more wide; keeled, twisted; dark green and shining on the upper surface, glaucous on the under one; glabrous on both, except a few scattered silky hairs on each; in the leaves of young shoots, closely

crenate, or notched with shallow, flat, or slightly waved, gland-pointed teeth. Petiole about a quarter of the length of the disk. Catkins of the male numerous and showy; produced about the beginning of April, earlier than in the generality of mountain willows. (*E. B. S.*) Ovary lanceolate subulate, on a long stalk, quite glabrous; style long, bifid; stigmas linear, bifid. (*Hooker.*) This kind, cultivated in the willow garden at Woburn Abbey, produced its flowers before the expansion of the leaves in April; and again, when the plant was in full leaf, in July. Trained to a single stem, it would form a very handsome small tree for suburban gardens. There are plants at Flitwick and Woburn.

♠ 135. *S.* DAVALLIA'NA Smith. Davall's Willow.

Identification. Smith Eng. Fl., 4. p. 175., as far as to the Scottish kind; Borrer in Eng. Bot. Suppl., t. 2701.; Smith's British specimens, not his Swiss one, were taken from the same individual as ours (*Borrer*); Forbes in Sal. Wob. No. 47.; Hook. Br. Fl., ed. 3.
Synonymes. *S.* tétrapla *Walker* (*Anderson*); *S.* phylicifòlia *Willd.* (*Mertens*); these relate to the female of the Scottish kind (*Borrer*): *S.* thymelæöìdes *Schleicher.* (*Forbes* in *Sal Wob.*)
The Sexes. The female is described and figured in *Eng. Bot. Suppl.* Mr. Borrer is not acquainted with the male, but has added a figure of a specimen of what Mr. Anderson regarded as such, prepared from a sketch made from one of Mr. Anderson's specimens in 1811. Two sexes are figured in *Sal. Wob.* As it is most probable that Mr. Borrer knew of these, perhaps he deemed the male erroneous.
Engravings. Eng. Bot. Suppl., t. 2701.; Sal. Wob., No. 47.; and our *fig.* 47. in p. 1614.

Spec. Char., &c. Upright. Leaves obovate lanceolate, flattish, very acutely pointed, obscurely toothed or serrated; glabrous on both surfaces, somewhat glaucous on the under one. Stipules minute. Young shoots and petioles pubescent. Bracteas obovate, silky. Ovary stalked, acute, silky. Style as long as the divided stigmas. (*Borr.* in *Eng. Bot. Suppl.*) The female is a native of Scotland. We have specimens from Teesdale that seem of the same species. (*Borr.*) A bushy shrub, with ascending branches, scarcely exceeding 4 ft. high. Twigs tinged with brown. (*Borr.*) It grows with me to from 6 ft. to 7 ft. high, with upright, dark brown, shining branches. (*Forbes.*) Leaves about 1½ in. long (*Borr.*), 1 in. broad, on luxuriant shoots (*Forbes*); upper surface dark green and shining, under surface pale, and more or less glaucous. Petiole rather long and slender. Catkins of the female about 1 in. long. The flowers appear when the leaves begin to expand, about the end of April. (*Borr.*) There are plants at Woburn, Henfield, and Flitwick.

? *Variety.*

♠ S. *Davalliàna Smith*, the Swiss kind. (*Smith Eng. Fl.*, iv. p. 175.)—Borrer has not identified, in *Eng. Bot. Suppl.*, this with the Scottish kind; hence it becomes right to register it separately. The following notice of it is derived from *Smith Eng. Fl.*:—M. Davall sent a specimen of the kind to Smith, in 1790, from Switzerland. This specimen, when shown to Professor Mertens, was pronounced by him to be of the *S.* phylicifòlia of Willdenow and other German botanists. "It is not, however, that of Linnæus, nor, apparently, that of Wahlenberg." It agrees with the female of the Scottish kind, except that the ovary, and all parts of the catkin, are much less silky.

♠ 136. *S.* TE'TRAPLA *Smith.* The four-ranked Willow.

Identification. Smith Eng. Fl., 4. p. 177., exclusively of the citation of Walker; Hook. Br. Fl., ed. 2., p. 426., exclusively of the citation of Walker; Borrer in Eng. Bot. Suppl., t. 2702.; ? Forbes in Sal. Wob., t. 49. Borrer has not quoted the last.
The Sexes. The female is described and figured in *Eng. Bot.*; the figure in *Sal. Wob.*, whether of this kind or not, is of the female; and a male is described there. Male flowers not known to Mr. Borrer; but who has found *S.* ramifùsca *Forbes* (*Sal. Wob.*, t. 53.), from recent specimens in leaf, so similar to *S.* tétrapla *Smith*, that he can scarcely doubt of that being the male of this.
Engravings. Eng. Bot. Suppl., t. 2702.; ? Sal. Wob., No. 49.; and our *fig.* 49. in p. 1614.

Spec. Char., &c. Upright. Leaves lanceolate, twisted, somewhat carinate, very acutely pointed, serrated; nearly glabrous on both surfaces, glaucous on the under one. Stipules small, half-heart-shaped. Young shoots and petioles pubescent. Bracteas lanceolate, silky. Ovary stalked, bluntish,

glabrous on the lower part. Style longer than the divided stigmas. (*Borrer* in *Eng. Bot. Suppl.*) Wild in Breadalbane, Scotland. Cuttings brought thence in 1810 produced plants that, in 1831, were upright shrubs, 12 ft. to 15 ft. high. Twigs straight, spreading, slightly tinged with brown. Leaves scarcely 2 in. long, except on luxuriant young shoots; rather rigid. Catkins of the female scarcely 1 in. long while the flowers are in blossom. Mr Borrer has thus contrasted the kind with *S.* Davalli*àna*: — It is much taller. The leaves are rather longer, and more spreading; less shining, and of a duller green above, and whiter on the under surface; and the flowers differ. The following traits of *S.* tétrapla are derived from Smith's description: — "The whole shrub is larger than *S.* Wulfeni*àna* (*S.* Weigeli*àna* Borr.); the leaves longer, more elliptical, and more pointed, with unequal coarse, and wavy serratures; deep green above; finely glaucous, with prominent pale or reddish veins beneath; glabrous, except a very minute, short, dense downiness on the upper side of the midrib and of the footstalks; sometimes even this slight pubescence is wanting." In conjunction with Mr. Forster, Mr. Forbes compared this species with his *S.* Wulfeni*àna*, to which he says, it does not bear the least alliance. Mr. Forbes notes it as flowering in April. There are plants at Woburn and Henfield; also in the Hackney arboretum.

■ 137. *S.* RAMIFU'SCA *Forbes*, ? *Anders.* The brown-branched Willow.

Identification. Mr. Forbes states that he obtained this new British species from Mr. Mackay of the Dublin Botanic Garden, who received it from the late Mr. George Anderson. (*Sal. Wob.*, No. 53.)
Synonyme. We find *S.* ramifúsca *Sal. Wob.*, t. 53., from recent specimens in leaf, so similar to our *S.* tétrapla, that we can scarcely doubt its being the male of that species. (*Borr.* in *Eng. Bot. Suppl.*, t. 2702.
The Sexes. The male is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 53.; and our *fig.* 53. in p. 1615.

Spec. Char., &c. Stem erect. Leaves elliptic-acute, serrated; shining above; glabrous, reticulated, and glaucous beneath. Stipules half-heart-shaped, serrated, and withering. Branches yellowish brown, pubescent when young. Catkins nearly 1 in. long, on short stalks. Anthers yellow, of 4 lobes. (*Sal. Wob.*, p. 105.) A native of Britain, but where is not stated; flowering, in the Woburn salictum, in April, before the expansion of the leaves, and again in July. An upright kind, attaining the height of between 12 ft. and 14 ft., with round, glabrous, dark green branches, of the preceding year's growth. The young twigs of a brownish yellow, slightly downy when young. Leaves alternate, somewhat erect, elliptical, acute, approaching to an ovate shape when fully grown; glabrous and shining on their upper surface, glaucous and reticulated beneath; the two or three youngest leaves only slightly downy, as also the tops of the young branches. Footstalks villous above, glabrous beneath, as also the midrib. Catkins nearly 1 in. long; often two catkins bursting from the same bud. There are plants at Woburn, Henfield, Flitwick, and also in the Goldworth Arboretum.

■ 138. *S.* FORBESIA'NA. Forbes's Willow.

Synonyme. *S.* Weigeli*àna* Forbes in Sal. Wob., No. 51., ? Willd. Sp. Pl., 4. p. 678. (*Forbes.*) Mr. Borrer has advised us, in his MS. list, that he is not certain whether *S.* Weigeli*àna* Eng. Bot. Suppl. and *S.* Weigeli*ana* Sal. Wob. are to be distinguished, and, if they are, which is the *S.* Weigeli*àna* Willd. See, also, Eng. Bot. Suppl., t. 2656. and t. 2795. While *S.* Weigeli*àna* Forbes remains unidentified with any other kind, it must be treated of as a distinct one.
The Sexes. The female is described and figured in *Sal. Wob.* Mr. Borrer has expressed the opinion that he has both male and female specimens of *S.* Weigeli*àna* Forbes from the Highlands of Scotland. (*Borr.* in *Eng. Bot. Suppl.*, t. 2795.)
Engravings. Sal. Wob., No. 51.; and our *fig.* 51. in p. 1615.

Spec. Char., &c. The following is the amount of Mr. Forbes's original description, taken separately from what he has quoted from Willdenow: — Upright, bushy, 5 ft. to 6 ft. high. Branches glabrous, brown. Leaves elliptic, acute, serrated, or finely toothed; entire towards the base; bright green and shining on the upper surface, glaucous and pale on the under one, where the veins are parallel, arched, and prominent. Stipules remarkably small, soon falling off. Catkins appearing, in the willow garden at Woburn Abbey, in

April, before the leaves expand. Ovary ovate lanceolate, downy. Style longer than the deeply parted stigmas. There are plants at Henfield.

139. *S.* WEIGELIA'NA Borr. Weigel's Willow.

Identification. Borr. in Eng. Bot. Suppl., t. 2656., perhaps exclusively of the identification of Willd., as intimated by Mr. Borrer at t. 2795., and in his MS. list, as follows:—"I am uncertain whether *S.* Weigeli*àna* Eng. Bot., 2656., and S. Weigeli*àna* Sal. Wob., are to be distinguished, and, if so, which is *S.* Weigeli*àna* Willd." Hook. Br. Fl., ed. 3., p. 434. ? exclusively of syn., Willd.; ? Hayne Abbild., p. 232., with a fig.
Synonymes. *S.* Wulfeni*àna* Smith Eng. Fl., 4. p. 176.; Rees's Cyclo., No. 16.; Forbes in Sal. Wob., No. 48.; excluding from each the foreign synonymes. (*Borrer.*)
The Sexes. Both sexes are figured in *Eng. Bot. Suppl.*; the male in *Sal. Wob.*, as that of *S.* Wulfen*iàna*.
Engravings. Eng. Bot. Suppl., t. 2656.; Sal. Wob., No. 48.; Hayne Abbild., t. 178.; our *fig.* 1340.; and *fig.* 48. in p. 1614.

Spec. Char., &c. Leaves elliptical, rhomboidal, or almost round, with a short point, obsoletely crenate; glabrous on both sides, glaucous beneath. Stipules small. Catkins on short stalks. Floral leaves small. Bracteas (scales) oblong, hairy, longer than the hairy stalk of the ovary. Style longer than the stigmas. (*Borrer.*) It seems not uncommon in the more mountainous parts of Britain: Breadalbane in Scotland, and Yorkshire and Westmoreland, are places named. Cultivated. It is an upright shrub, about 10 ft. high. Mr. Borrer thinks it probable that it is of more humble growth in its native stations. Leaves thin, dark green, and more glittering than those of *S.* nìtens; the under surface very glaucous. The catkins appear earlier than the leaves, about April or May, and are very similar to those of *S.* nìtens. It is difficult to define satisfactorily the distinctions between *S.* Weigeli*àna* and *S.* nìtens; yet the aspect of the two is unlike, from the dark hue of the whole bush in *S.* nìtens; and there seems to be a real difference in the structure of the leaves. (*Borrer.*) There are plants at Henfield.


1340

Variety. In what seems a variety of this species, the leaves are more conspicuously toothed, rather silky when young; the shoots more downy, and the ovary pubescent towards the point only. (*Borrer.*)

140. *S.* NI'TENS *Anders.* The glittering-*leaved* Willow.

Identification. Anders. MS.; Smith Eng. Fl., 4. p. 175.; Forbes in Sal. Wob., No. 44.; Hook. Br. Fl., ed. 2., p. 426.; Borr. in Eng. Bot. Suppl., t. 2655.
The Sexes. Both sexes are described and figured in *Eng. Bot. Suppl.*
Engravings. Eng. Bot. Suppl., t. 2655.; Sal. Wob., No. 44.; *fig.* 1341.; and *fig.* 44. in p. 1613.

Spec. Char., &c. Leaves ovate, or elliptical, acute, slightly serrated; nearly glabrous above, with sunk veins; glabrous and glaucous beneath. Stipules small. Catkins on short stalks. Floral leaves small. Bracteas (scales) oblong, hairy, longer than the hairy stalk of the ovary. Style longer than the stigmas. Nearly allied to *S.* Weigel*iàna*, and more nearly to *S.* Crowe*àna*. (*Borrer* in *Eng. Bot. Suppl.*) Mr. G. Anderson first distinguished the kind; and the male specimens figured were derived from a plant that he communicated to Mr. Borrer: the female came from Teesdale. The kind is an upright shrub, taller, and of rather stouter growth, than *S.* Borrer*iàna*, which it resembles in the dark mahogany hue of its shining twigs, most remarkable in the male. Young shoots slightly pubescent. Petioles short, reddish. Disk of leaf about 1½ in. long, in many instances waved or twisted; upper surface dark green, shining, more or less silky when young, afterwards glabrous, except on the midrib; under surface glaucous, and even white. The flowers appear with Mr. Borrer earlier than the leaves, in April or May, about a fortnight later than those of *S.* Borrer*iàna*. Catkins of the male scarcely 1 in. long; of the female, by the figure, more than 1 in. There are plants at Woburn, Flitwick, Henfield, Goldworth, and Hackney.


1341

♠ 141. *S.* CROWEA'NA Smith. Crowe's Willow.

Identification. Smith Eng. Bot., t. 1146.; Willd. Sp. Pl., 4. p. 675.; Smith in Rees's Cyclo., No. 51.; Eng. Fl., 4. p. 192.; Forbes in Sal. Wob., No. 52.; Hook. Br. Fl., ed. 3.
Synonymes. *S.* arbúscula *Wahlenb.*, var. *Koch Comm.*, p. 45.; *S.* hùmilis *Schl.* is cited in *Sal. Wob.* as the female of *S.* Croweàna Smith; ? *S.* heterophýlla *Host.*
The Sexes. Both sexes are described in *Eng. Bot.*, and figured in *Sal. Wob.* Mr. Borrer deems the case of the combination of the filaments to be one monstrous in the species, rather than innate and characteristic.
Engravings. Eng. Bot., t. 1146.; Sal. Wob., No. 52.; and our *fig.* 52. in p. 1615.

Spec. Char., &c. Filaments combined below. Leaves elliptical, slightly serrated, quite glabrous, glaucous beneath. (*Smith Eng. Fl.*) Mr. Borrer regards (*Eng. Bot. Suppl.*, t. 2660.; and *Hook. Br. Fl.*, ed. 2.) the combination of the filaments as not a constitutional character of this species, but as only such of the individual, from which all the individuals that are in this case, that he has examined, have been propagated; and he regards the state as one founded in monstrosity. He has added, in argument: "Indeed," the stamens "are represented in the *Salictum Woburnense* as changing into" ovaries, "as those of *S.* bícolor *Ehrhart*, and some of the common sallows, have been observed to do." See notices of instances below, and in p. 1454.; and Mr. Borrer has since found this change taking place in *S.* Croweàna, in his own garden. He views *S.* nìtens *Anderson* and *S.* Croweàna Smith as very closely akin; and, in the following notice of some differences between them which he has made (*Eng. Bot. Suppl.*, t. 2660.), it may be inferred that what he deems characteristic features are noticed: — "The leaves of *S.* Croweàna are less pointed, almost obovate; in every stage without pubescence, even in the petiole; their edges rarely waved, and more obscurely crenate; and the scales of the catkins, that is, the bracteas of the individual flower, shorter and rounder." According to Hooker's *British Flora*, ed. 2., Mr. Borrer finds the ovary, not downy, as Smith has described it to be, "but nearly glabrous, as figured in the *Salictum Woburnense*." A native of England (*Smith*), in swampy meadows and thickets, flowering in April and May. "*S.* Croweàna, with submission, is not a Norfolk plant, but from the river Ettrick, near Selkirk, whence Mr. Dickson sent it to Mr. Crowe; and he gave me fresh cuttings from the same place three years ago, which turn out exactly the same individual as Crowe's from Dr. Smith." (*Mr. Anderson*, in a letter to Mr. Borrer, 1815.) The following traits are drawn from Smith's detailed description in his *English Flora*: — "A bushy shrub, usually 4 ft. or 5 ft. high, with many stout, irregularly spreading, glabrous, leafy, brittle, brownish yellow branches. Leaves alternate, perfectly glabrous, on broadish glabrous footstalks, uniformly elliptical, very rarely inclining to obovate, 1½ in. long, more or less, acute, and often recurved at the extremity, contracted gradually at the base; the margin copiously, though not conspicuously, serrated, or rather crenate; the upper side of a deep shining green, under glaucous, veiny. The catkins appear before the leaves, and are about 1 in. long; those of the male of a bright yellow. This Sàlix, when covered with male blossoms, is amongst the most handsome; nor are the leaves destitute of beauty." *S.* Croweàna has grown 10 ft. high with Mr. Borrer. Mr. Forbes has figured a curious monstrosity in the plant of this species which is in the Woburn salictum, of the catkins of the male changing into ovaries, with the style and stigmas perfect, as in the fertile flower. Mr. Forbes observed the progressive change of the stamens into ovaries. At first, he says, the filaments began to thicken a little in the middle when they were united, and they gradually grew into their subsequent shape, the filaments becoming pistils, and the anthers stigmas. Sir W. J. Hooker states that a similar alteration has been remarked by Mr. Borrer in *S.* oleifòlia, and Mr. R. Gee in *S.* cinèrea. There are plants at Woburn, Henfield, and Flitwick.

♠ 142. *S.* BI'COLOR *Ehrh.* The two-coloured Willow.

Identification. Ehrh. Arb., 118.; Hook. Br. Fl., ed. 2., p. 427.; ? Hayne Abbild., p. 238.
Synonymes. *S.* tenuifòlia *Smith Eng. Bot.*, t. 2186., as to the figure; *S.* floribúnda *Forbes* in *Sal. Wob.*, No. 54. *Koch*, in his *Comm.*, has identified *S.* bicolor *Ehrh.* with *S.* lívida *Wahlenb.*; and noted that what is frequently cultivated in German gardens as *S.* bicolor *Ehrh.* is of another spe-

cies, and much nearer to *S.* arbúscula *Wahlenb.* Mr. Borrer has remarked on this as follows:— "I am not acquainted with *S.* lívida *Wahl.* If this prove *S.* bícolor *Ehrh.*, our *S.* bícolor, which is the plant of the German gardens, as I conclude from Mertens having given it me as *S.* bícolor, may bear Forbes's name of floribúnda, unless Schrader's older name, discolor, belongs to it: see *Koch*, p. 46." (*Borrer* in a letter.)

The Sexes. The male is described in *Sal. Wob.*, and figured in *Eng. Bot.* and *Sal. Wob.*; some notice of what Mr. Borrer deems the female is given in *Hook. Br. Fl.*, ed. 2.

Engravings. Eng. Bot., t. 2186.; Sal. Wob., No. 54.; and our *fig.* 54. in p. 1615.; ? Hayne Abbild., t. 180., where the sex figured is the male.

Spec. Char., &c. Leaves elliptical, green and shining above, glabrous and glaucous beneath; serrated, ending in oblique points. Stipules crescent-shaped, serrated. Catkins of the male copious, bright yellow. Filaments slightly bearded at the base. (*Sal. Wob.*, p. 107.) A native of Britain; flowering, in the willow garden of Woburn Abbey, in April, and again in July. A bushy spreading shrub, with short yellow branches, slightly villous when young; the older ones rather a yellowish green, quite glabrous; rising to the height of 6 ft. or 8 ft., with bright yellow catkins in April, and again in July. Leaves elliptical, acute, serrated, glabrous; shining above, glaucous and veiny beneath; glabrous in every state of growth, with the exception of a slight downiness on the very youngest leaves, which are always of a purplish colour; midrib and footstalks glabrous, yellow. Stipules crescent-shaped, serrated. This is a very ornamental species when in flower; neither are the leaves destitute of beauty; and, when the shrub is cut down, it produces tough, flexible twigs, that are good for tying, basketwork, &c. *S.* bícolor has become 10 ft. high with Mr. Borrer. (*Eng. Bot. Suppl.*, t. 2660.) There are plants at Henfield.

■ 143. *S.* PHILLYREIFO'LIA *Borrer.* The Phillyrea-leaved Willow.

Identification. Borrer in Eng. Bot. Suppl., t. 2660.; Hook. Br. Fl., ed. 2. p. 417.

The Sexes. Both sexes are described and figured in *Eng. Bot. Suppl.*, the female in the fruit-bearing state.

Engraving. Eng. Bot. Suppl., t. 2660.

Spec. Char., &c. Leaves elliptic-lanceolate, acute at each end, strongly serrated, glabrous on both surfaces, glaucous on the under one. Stipules small. Young shoots pubescent. Bracteas (scales) oblong, hairy, longer than the glabrous stalk of the glabrous ovary. Style as long as the stigmas. In the arrangement of the kinds, this one may stand between *S.* bícolor and S. Dicksoniàna, in both of which the leaves are for the most part obsoletely serrated, and of a figure approaching to obovate with a point. (*Borrer.*) Mr. Borrer has thus stated its localities in a wild state. Highland valleys of Scotland, particularly in Glen Tarfe, near Fort Augustus, Inverness-shire; and in the vicinity of Ben Lawers, Perthshire. He has termed it a beautiful kind. The male, growing in his garden since 1810, had become, in 1830, an upright much branched shrub, about 5 ft. high; and it flowers in about the middle of April, before the leaves appear, and sometimes again at midsummer. Catkins numerous, cylindrical, ¾ in. long, closely set with flowers. The leaves, in size, figure, and serratures, bear no slight resemblance to those of *Phillýrea* latifòlia: when young, they are sprinkled on both surfaces with minute appressed hairs, but become at length glabrous, except in the upper surface of the petiole and midrib. The disk of the leaf is scarcely more than 1 in. long, and has its upper surface of a bright, shining, full green; the under surface bluish: the petiole is about a third of the length of the disk. There are plants at Henfield.

■ 144. *S.* DICKSONIA'NA Smith. Dickson's Willow.

Identification. Smith Eng. Bot., t. 1390.: the figure is bad, and has led to doubts as to this species, which only authenticated specimens could remove. (*Borrer* in *Eng. Bot Suppl.*, t. 2663., incidentally.) Willd. Sp. Pl., 4. p. 696.; Smith in Rees's Cyclo., No. 60.; Eng. Fl., 4. p. 196.; Forbes in Sal. Wob., No. 55.; Hook. Br. Fl., ed. 3.

Synonyme. *S.* myrtilloìdes *Smith Fl. Brit.*, p. 1056., not of Lin.

The Sexes. The female is described in *Eng. Fl.* and *Sal. Wob.*, and figured in *Eng. Bot.* and *Sal. Wob.* Smith has noticed, in his *English Flora*, that he had not observed the stamens.

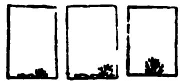
Engravings. Eng. Bot., t. 1390., see under *Identification*, above; Sal. Wob., No. 55.; and our *fig.* 55. in p. 1615.

Spec. Char., &c. Leaves elliptical, acute, slightly toothed, glabrous; glaucous beneath. Young branches very glabrous. Catkins ovate, short, erect. Ovary stalked, ovate, silky. Stigmas nearly sessile. (*Smith Eng. Fl.*, iv. p. 196.) Leaves, for the most part, obsoletely serrated, and of a figure approaching to obovate with a point. Ovary and its stalk densely silky. (*Borrer* in *Eng. Bot. Suppl.*, t. 2660., incidentally.) A native of Scotland; flowering in April. The following traits are derived from Mr. Forbes's description:—"A low-growing upright shrub, attaining the height of 18 in. or 2 ft., with smooth yellow branches; the preceding year's are greenish and scaly. The leaves are elliptic, obovate, minutely serrated in the middle, or denticulated; entire at both extremities; glabrous and shining above, and very glaucous

underneath. The footstalks are long and slender, dilated at the base." From the remarks made by Sir W. J. Hooker in *Brit. Fl.* (ed. 2.), and by Mr. Forbes, there seems to be a good deal of uncertainty as to this species; which, as far as we are concerned, must be left to time, and the examination of plants in a living state, to be cleared up. There are plants at Henfield.

Group xix. *Vacciniifòliæ* Borrer.

Small, and generally procumbent, Shrubs.



Stamens 2 to a flower. Ovary sessile, downy. Leaves bearing a considerable resemblance to those of a *V*accínium; opaque; the under surface glaucous. Plants, small shrubs, usually procumbent, rarely erect. (*Hook. Br. Fl.*, ed. 2., adapted.) It is probable that *S.* arbúscula *L.* is the same as one or more of the four kinds, *S. v*acciniifòlia *Walker*, *S.* carinàta *Smith*, *S. p*runifòlia *Smith*, and *S.* venulòsa *Smith*. (*Borrer* in his manuscript list.)

✻ 145. *S. V*ACCINIIFO'LIA *Walker*. The Vaccinium-leaved Willow.

Identification. Walker's Essay on Nat. Hist. (*Hook Br. Fl.*, ed. 2.), ed. 1812, p. 460.; Smith Eng. Bot., t. 2341.; Rees's Cyclo., No. 56.; Eng. Fl., 4. p. 194.; Forbes in Sal. Wob., No. 57.; Hook. Br. Fl., ed. 3.
Synonyme. *S. p*runifòlia, part of, *Koch Comm.*, p. 59.
The Sexes. Both sexes are figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 2341.; Sal. Wob., No. 57.; our *fig.* 1342., and *fig.* 57. in p. 1615.

Spec. Char., &c. Leaves lanceolate-ovate, serrated; glabrous and even above, glaucous and silky beneath. Capsules ovate, silky. Stems decumbent. (*Smith Eng. Fl.*) A native of Scotland, on Highland mountains; flowering in May. A low decumbent shrub, very distinct from *S. p*runifòlia, of a much more humble stature, with decumbent, or trailing, long, and slender branches, silky when young, though otherwise glabrous. Leaves of but half the breadth of those of *S. p*runifòlia or *S.* venulòsa, covered at the back with close, delicate, almost invisible, silky hairs, and likewise very glaucous; the floral ones ovate, obtuse, on long silky footstalks, and beautifully silky at the back, especially when young; the upper surface of all the leaves even and glabrous, nearly as much so as in *S. p*runifòlia. "An humble and pretty little shrub, which I had referred (in *Flora Scot.*) to a variety of *S. p*runifòlia, and which is very closely allied to *S.* carinàta, *p*runifòlia, and venulòsa." (*Hook.*) Of all the willows, it most resembles in foliage the *V*accínium Myrtíllus *L.*, or bilberry. The leaves have the teeth each terminated by a small spherical gland, and these are, especially in early summer, of a pretty bright yellow colour. (*Walk. Ess.*, ed. 1812, p. 461.) There are plants at Woburn, Henfield, and Flitwick, and in the Goldworth Arboretum.



1342

■ 146. *S.* CARINA'TA *Smith*. The keeled, *or folded-leaved*, Willow.

Identification. Smith Fl. Br., 1055.; Eng. Bot., t. 1363.; Willd. Sp. Pl., 4. p. 680.; Smith in Rees's Cyclo., No. 63.; Eng. Fl., 4. p. 197., Forbes in Sal. Wob., No. 59.; Hook. Br. Fl., ed. 3.
Synonyme. *S. p*runifòlia, part of, *Koch Comm.*, p. 58.
The Sexes. The female is figured in *Eng. Bot.* and in *Sal. Wob.*
Engravings. Eng. Bot., t. 1363.; Sal. Wob., No. 59.; and *fig.* 59. in p. 1615.

Spec. Char., &c. Leaves ovate, finely toothed, glabrous, minutely veined, folded into a keel. Catkins cylindrical, with rounded hairy bracteas. Ovary sessile, ovate, silky. (*Smith Eng. Fl.*) A native of the Highlands of Scotland, on mountains; flowering there in June, and, in the willow garden at Woburn Abbey, in April, and again in August. Larger and more erect than *S. p*runifòlia or *S.* venulòsa, to both which it is nearly related in the fertile catkins. Mr. Forbes considers this too different from *S. v*acciniifòlia and *S.* venulòsa, to require any detailed comparative view of them. There are plants at Woburn and Flitwick.

✻ 147. *S.* PRUNIFO'LIA *Smith*. The Plum-leaved Willow.

Identification. Smith Fl. Br., p. 1054.; Eng. Bot., t. 1361.; Rees's Cyclo., No. 55.; Willd. Sp. Pl., 4. p. 677.; Smith Eng. Fl., 4. p. 193.; Forbes in Sal. Wob., No. 56.; Hook. Br. Fl., ed. 3.
Synonymes. *S. Myrsinites Lightf.*, not Lin.; *S. p*runifòlia, part of, *Koch Comm.*, p. 59.
The Sexes. The female is figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1361.; Sal. Wob., No. 56.; and our *fig.* 1615.

Spec. Char., &c. Leaves broadly ovate, serrated, glabrous on both sides; even above, glaucous beneath. Stem erect, much branched. Capsules ovate, shaggy, like the bracteas, with silky hairs. (*Smith Eng. Fl.*) A native of Scotland; flowering in April. Described by Smith as a bushy shrub, often 3ft. high, with spreading branches; the whole erect, or ascending, not decum-

bent. In the Woburn salictum, it grows about 18 in. high, quite upright. Young branches brown, bearing a little short, soft, curved down; not rigid prominent hairs, as in the *S. betulifòlia Forster*. Leaves broadly ovate, tolerably uniform, 1 in. long, or rather more, bluntly pointed, serrated throughout, but not deeply; quite glabrous, even, of a full shining green on the upper surface, without any prominent veins; glaucous, veiny when very young only, besprinkled with a few silky close hairs, beneath. Catkins obtuse, of a brownish purple, much shorter than those of *S. vacciniifòlia*, *S.* venulòsa, and *S.* carinàta; and more like those of *S. betulifòlia Forster*. The branches are, likewise, more thickly clothed with upright shorter leaves, than those of either *S.* venulòsa or S. *vacciniifòlia*. The above is derived partly from Smith, and partly from Forbes. There are plants at Woburn and Flitwick.

Variety.

- S. p. *stỳlo longiòre* Koch, style longer; *S. prunifòlia Ser. Sal. Helv.* p. 49.; *S.* formòsa *Willd. Sp. Pl.*, iv. p. 680.; *S.* fœ'tida *Schleich. Cent.*, ii. n. 95.; *S.* alpìna *Sut. Helv.*, p. 283.—This is wild in Switzerland. (*Koch Comm.*) *S.* formòsa *Willd.* is registered in Sweet's *Hortus Britannicus* as introduced in 1820.

148. *S.* VENULO'SA *Smith.* The veiny-*leaved* Willow.

Identification. Smith Fl. Br., 1055.; Eng. Bot., 1362.; Rees's Cyclo., No. 57.; Eng. Fl., 4. p. 195. Forbes in Sal. Wob., No. 58.; Hook. Br. Fl., ed. 3.
Synonyme. *S. prunifòlia*, part of, *Koch Comm.*, p. 41.
The Sexes. The female is figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1362.; Sal. Wob., No. 56.; and *fig.* 56. in p. 1615.

Spec. Char., &c. Leaves ovate, serrated, naked, reticulated with prominent veins above, rather glaucous beneath. Capsules ovate, silky. Stem erect, much branched. (*Smith Eng. Fl.*) A native of Scotland, on the Breadalbane Mountains, where the blossoms are in perfection in June; but in gardens they flower in April; and, in the willow garden at Woburn Abbey, they flower a second time in August. In size and general habit, this species agrees with *S. prunifòlia*; but the somewhat narrower leaves differ materially on their upper surface, in their prominent, elegantly reticulated veins, conspicuous in the dried as well as growing specimens, especially towards the margin. The under side is generally less glaucous than in the two last; and, in having many close-pressed hairs, comes nearest to *S. vacciniifòlia*. Catkins much longer and more slender than in *S. prunifòlia*; and the whole shrub is more erect, and grows in the Woburn collection to twice the height of either *S. prunifòlia* or *S. vacciniifòlia*. Sir W. J. Hooker agrees with Mr. E. Forster, in considering *S.* venulòsa as only a variety of *S. prunifòlia*; and, indeed, he doubts if *S. prunifòlia*, *S.* carinàta, and *S. vacciniifòlia*, with *S.* venulòsa, are not different states of the same species; and Koch and Dr. Lindley are of this opinion, having included them all under one species, *S. prunifòlia*. We accordingly consider those forms as varieties, though we have treated them, to a certain extent, as if they were species, for the sake of those who differ from us in opinion. Mr. Borrer has remarked, in the manuscript list with which he has favoured us, that probably *S.* arbúscula *L.* is the same as one or more of the kinds *S. vacciniifòlia Walk.*, *S.* carinàta *Smith*, *S. prunifòlia Smith*, and *S.* venulòsa *Smith*. There are plants at Woburn, Henfield, and Flitwick.

149. *S.* CÆ'SIA *Villars.* The grey-*leaved* Willow.

Identification. Villars Dauph., 3. 768.; Smith in Rees's Cyclo., No. 80.; Koch Comm., p. 59.
Synonymes. *S.* myrtilloìdes *Willd. Sp. Pl.*, 4. p. 686., exclusively of the synonymes of Linnæus (*Borrer*), *Forbes* in *Sal. Wob.*, No. 66. (*Borrer*); *S.* prostràta *Ehrh. Pl. Select.*, p. 159., according to Seringe (*Koch*).
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Villars Dauph., 3. t. 50. f. 11.; Sal. Wob., No. 66.; and our *fig.* 66. in p. 1616.

Spec. Char., &c. Leaves elliptic or lanceolate, acuminate, glabrous, not shining, entire and revolute at the edge. Catkin upon a short leafy twiglet. Capsule ovate-conical, tomentose, seemingly sessile, eventually having a very short stalk. Gland reaching as high as the base of the capsule. Style shortish. Stigmas ovate-oblong, entire, and bifid. (*Koch.*) Wild in the Alps of Dauphiné, and in Savoy, upon the mountain Enzeindog. (*Id.*) Registered as introduced in 1824. Mr. Forbes has given a detailed description, whence we quote as follows:—"A low straggling shrub, attaining the height of 3 ft. or 4 ft., with slender shortish branches, dark brown on their upper side, pale beneath, somewhat wrinkled or striated. Leaves about 1 in. long, perfectly entire, wavy, with a short sharp point; very glabrous, glaucous and veiny beneath; lower opposite, upper alternate. Catkins from ½ in. to nearly 1 in. in length, appearing, in the willow garden at Woburn Abbey, along with the leaves, in April or May, and again in August. Koch has noted (*Comm.*, p. 52.) that *S.* cæ'sia *Villars* differs from

S. myrtillöìdes *L.* wholly in habit, and in its capsules being sessile, and densely tomentose. There are plants at Henfield.

Group xx. *Myrtillöìdes* Borrer.

Small Bilberry-like Shrubs, not Natives of Britain.

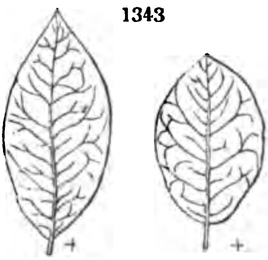


This group consists of exotic kinds, and, therefore, does not appear in *Hook. Br. Fl.*; and, consequently, we cannot quote characteristics thence. In *S.* myrtillöìdes *L.*, we believe that the epithet was meant to express a likeness in the foliage to that of *Vaccinium* Myrtillus *L.*; and we suppose that this likeness appertains to each of the kinds of which Mr. Borrer has constituted his group Myrtillöìdes.

150. *S.* MYRTILLÖÌ'DES *L.* The Myrtillus-like, *or Bilberry-leaved*, Willow.

Identification. Lin. Sp. Pl., 1446.; Fl. Lapp., ed. 2, 295.; Smith in Rees's Cyclo., No. 79.; Wahl. Fl. Lapp., p. 267.; Koch Comm., p. 52.
Synonyme. *S.* élegans *Besser En. Pl. Volhyn.*, p. 77. (*Koch.*)
The Sexes. The female is described in *Rees's Cyclo.*, and the male partly so. The female is noticed below.
Engravings. Lin. Fl. Lapp., ed. 2., t. 8. f. *i. k.*; and our *fig.* 1343.

1343



Spec. Char., &c. Leaves very various in form, ovate, subcordate at the base, oblong, or lanceolate; entire, opaque, glabrous; veins appearing reticulated beneath. Stipules half-ovate. Fruit-bearing catkin (? catkin of the female in any state) borne on a leafy twiglet. Bracteas (scales) glabrous or ciliated. Capsules (? or rather ovaries) ovate-lanceolate, glabrous, upon a stalk more than four times as long as the gland. Style short. Stigmas ovate, notched. (*Koch.*) The flowers of the female are disposed in lax cylindrical catkins. (*Smith* in *Eng. Fl.*, 4. p. 196.) Wild in the infra-alpine bogs of the Carpathians, and in spongy bogs of Poland, Livonia, Volhynia, and through Russia, Sweden, and Lapland. It occurs in the alps of Bavaria, whence it descends into the valleys; and has been gathered even near Munich, in turfy ground. (*Koch.*) This is registered as having been introduced into Britain in 1772. Mr. Borrer has remarked in the list that he is not aware that it has been introduced alive into Britain.

151. *S.* PEDICELLA'RIS *Pursh.* The *long*-stalked-*capsuled* Willow.

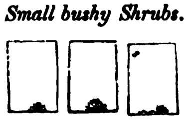
Identification. Pursh Fl. Amer. Sept., 2. p. 611.; Smith in Rees's Cyclo., No. 78.
Synonyme. *S.* pennsylvánica *Host.*
The Sexes. The female is noticed in the *Specific Character.*
Spec. Char., &c. Stem erect. Branches glabrous. Leaves obovate-lanceolate, acute, entire, glabrous, green on both surfaces. Stipules none. Catkins stalked, nearly glabrous. Bracteas oblong, scarcely hairy. Ovary ovate, oblong, glabrous, upon a stalk twice as long as the bractea. Stigma sessile, divided. Wild on the Catskill Mountains, New York; flowering in April. An elegant and singular species. Introduced by Pursh in 1811. (*Pursh*, *Smith*, and *Hort. Brit.*)

152. *S.* PLANIFO'LIA *Pursh.* The flat-leaved *Labrador* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 611.; Smith in Rees's Cyclo., No. 92.
Spec. Char., &c. It is inclined to rise from the ground on a single stem. Branches divaricating, glabrous. Leaves oblong-lanceolate, very glabrous, flat, spreading; acute at each end, minutely serrated in the middle, paler beneath. Stipules none. Native of Labrador. Seen by Pursh, in Mr. Anderson's garden, without flowers. (*Pursh* and *Smith.*) Introduced in 1811. Perhaps this is not of the group Myrtillöìdes. (*Borrer* in a letter.) This singular species is easily distinguished, Pursh observes, by its remarkably flat and spreading leaves, and by its being, though procumbent, inclined to rise from the ground on a single low stem. (*Fl. Amer. Sept.*, 2. p. 611.)

Group xxi. M*yrsinìtes* Borrer.

Small bushy Shrubs.



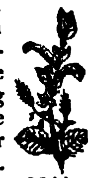
Stamens 2 to a flower. Ovaries downy. Leaves oval or broadly elliptical, serrated, small, glossy, rigid. Plants small and bushy. (*Hook. Br. Fl.*, adapted.) It seems to be the case that the epithet *M*yrsinìtes, in *S. M*yrsinìtes *L.*, has been intended to imply a likeness in the foliage of that kind to

that of the *Vaccínium Myrsinìtes*; and it may be supposed that this character obtains more or less in all the kinds of the group.

153. *S. Myrsini'tes* *L.* The Whortleberry-*leaved* Willow.

Identification. Lin., cited by Borrer in Eng. Bot. Suppl., t. 2753., the text; Fl. Dan., t. 1054. (*Smith.*)
Synonymes. *S. Myrsinìtes* β, *Smith Eng. Fl.*, 4. p. 195., *Hook. Br. Fl.*, ed. 2., p. 429.; *S. arbutifòlia* *Willd. Sp. Pl.*, 4. p. 682.; probably *S. Macnabiàna* Macgillivray in Jameson's *Edinb. Phil. Jour.*, Oct. 1830. (*The above indicated by Borrer.*) *S. Myrsinìtes Koch*, part of, *Koch Comm.*, p. 60.; *S. arbutifòlia Willd.*, *Smith* in *Rees's Cyclo.*, No. 67.; *S. dùbia Suter Helv.*, p. 283. (*Willd.*)
The Sexes. It is implied in the *Spec. Char.*, &c., that the female is known.
Engraving. Fl. Dan., t. 1054. (*Smith.*)

Spec. Char., &c. This has, like *S. betulifòlia*, short catkins, and distinctly serrated leaves; but these are more acute, and of an ovate-lanceolate figure; and the long style seems to afford a distinctive character. (*Borrer* in *Eng. Bot. Suppl.*, t. 2753., in the text.) It occurs on various Scottish mountains. (*Id.*) Wahlenberg compares the stems and leaves to those of *Bétula nàna*, from the glossy greenness of the latter, their prominent veins, and their remaining on the shoots in a withered state till the following year. The whole plant is very dark, and almost black when dry. (*Hook. Br. Fl.*)


1344

154. *S. betulifo'lia* *Forster.* The *dwarf* Birch-leaved Willow.

Identification. Forster MS., cited by Borrer in Eng. Bot. Suppl., t. 2753., in the text.
Synonymes. *S. Myrsinìtes Smith Eng. Bot.*, t. 1360., exclusively of the references to Hoffmann (*Smith* in *Eng. Fl.*), *Eng. Fl.*, 4. p. 195., exclusively of the var. β, *Forbes* in *Sal. Wob.*, No. 60., *Hook. Br. Fl.*, ed. 2., p. 429., exclusively of the var. β, not of Linn. (*Borrer*); *S. Myrsinìtes Koch*, part of, *Koch Comm.*, p. 60.
The Sexes. The female is described in *Eng. Fl.*, and figured in *Eng. Bot.* and *Sal. Wob.*
Engravings. Eng. Bot., t. 1360.; Smith in Eng. Fl. has quoted, besides, Lin. Fl. Lapp., t. 7. f. 6. t. 8. f. *f*; and Villars Dauph., 3. t. 50. f. 12.; but has designated this as "bad:" Sal. Wob., No. 60.; our *fig.* 1345.; and *fig.* 60. in p. 1615.

Spec. Char., &c. It differs from *S. procúmbens* by its smaller, rounder, more conspicuously serrated leaves; shorter, almost ovate, catkins; shorter, more truncate, and paler bracteas (scales); and more distinctly quadrangular ovary. From the remarkable *primâ facie* resemblance of its leaves to those of *Bétula nàna*, Mr. Forster has suggested for it the name of *betulifòlia*. (*Borrer* in *Eng. Bot. Suppl.*) Mr. Borrer regards it as not certain that this kind is a native of Britain; and the question resting on whether the kind found by Dr. Stuart in the mountains of Glencoe is identical with *S. Myrsinìtes* of *Eng. Bot.*, or with *S. procúmbens Eng. Bot. Suppl.*, he has stated that, to ascertain this, it would be necessary to inspect the specimens of the kind found by Stuart, preserved in Lightfoot's herbarium. If the kind prove not British, Mr. Borrer does not know its source. Cultivated in the willow garden at Woburn Abbey, it has flowered in May, and again in August. A sturdy, upright, bushy shrub, 1 ft. to 2 ft. high, with abundance of short, leafy, dark purplish branches, hairy when young, not downy. Leaves very different from those of all the foregoing species, except *S. malifòlia*, in their rigid, thin, crackling, veiny texture; without anything glaucous or cottony about them, the fine hairs on the younger ones being scattered and silky. (*Smith Eng. Fl.*) Pursh has included in his *Flor. Amer. Sept.*, ii. p. 617., a North American kind of willow, named *S. Myrsinìtes*: ? is this the same as either of the above.


1345

155. *S. procu'mbens* *Forbes.* The procumbent Willow.

Identification. Forbes in Sal. Wob., No. 61., exclusively of the synonymes. The figure is not a characteristic one. (*Borrer* in *Eng. Bot. Suppl.*, t. 2753.) Hook. Br. Fl., ed. 2., p. 429.; Borrer in Eng. Bot. Suppl., t. 2753.
Synonymes. *S. læ'vis Hook. Br. Fl.*, ed. 1., p. 432.; *S. retùsa Wither. Bot. Arr.*, ed. 4., 2. p. 49., and a figure.
The Sexes. The female is described and figured in *Eng. Bot. Suppl.* and *Sal. Wob.* The male plant has not come under our notice. (*Borrer.*)
Engravings. Wither. Bot. Arr., ed. 4., vol. 2.; Sal. Wob., No. 61., the figure not a characteristic one; Eng. Bot. Suppl., t. 2753.; and our *fig.* 61. in p. 1615.

Spec. Char., &c. Branches diverging. Leaves oval, minutely serrated, recurved, bright green and shining on both surfaces. Catkins elongated,

thick, cylindrical. Ovary nearly sessile, tapering, obsoletely quadrangular. Style short, deeply cloven. Stigmas spreading, bifid. (*Borrer* in *Eng. Bot. Suppl.*) A native of the Highlands of Scotland: it has been found in the mountains of Breadalbane, and upon Brae-Riach, one of the Cairngorm range. It flowers in June, but, in the willow garden at Woburn Abbey, in May. The following characters are some of those described of it by Mr. Forbes:—A low procumbent shrub, extending along the ground, with greenish brown, pubescent, round, shortish branches. Leaves from 1 in. to 1½ in. long, and upwards of 1 in. in breadth; of a roundish-elliptical shape, hollowed out, or somewhat heart-shaped, at the base; bright green and shining on both sides; always perfectly glabrous and serrated. Readily distinguished from *S. betulifòlia*, which at first sight it greatly resembles, by its procumbent mode of growth, and large elongated catkins. Dr. Hooker has observed of it, that it is a beautiful shrub; and that it has been cultivated for years in the Edinburgh Botanic Garden, where it retains all its characters. There are plants of it at Henfield.

✻ 156. *S.* RETU'SA *L.* The retuse-*leaved* Willow.

Identification. Lin. Sp. Pl., 1445.; Willd. Sp. Pl., 4. p. 684.; Hayne Abbild., p. 234.; Smith in Rees's Cyclo., No. 70.; Forbes in Sal. Wob., No. 139.
Synonymes. *S.* retùsa *Koch*, part of, *Koch Comm.*, p. 62.; *S.* serpyllifòlia *Jacq. Austr.*, t. 298. (*Koch.*)
The Sexes. Both sexes are described in *Rees's Cyclo.*, and thence in *Sal. Wob.*, and below; and both are figured in *Hayne Abbild.*: the male is figured in *Sal. Wob.*
Engravings. Bocc. Mus., 1. t. 1.; Jacq. Austr., t. 298.; Hayne Abbild., t. 176.; Sal. Wob., No. 139.; our *fig.* 1346.; and *fig.* 139. in p. 1630.

Spec. Char., &c. Leaves obovate, entire, glabrous, shining above. Catkins of the female oblong, of few flowers. Bracteas (scales) the length of the oblong smooth ovary. (*Smith* in *Rees's Cyclo.*) Native of the alps of Germany, Switzerland, France, and Italy, but not of Britain or the north of Europe. The main stems are woody, depressed, trailing, branched, often of great thickness, throwing up many short, glabrous, leafy branches, which are likewise partly decumbent. Leaves stalked, various in size and breadth, but usually from ½ in. to 1 in. long, and from one to four lines broad; quite entire, abrupt, or even emarginate, at the extremity; tapering at the base; furnished with one rib, and many straight parallel veins. Catkins lax; those of the male yellow, with elliptic, oblong, slightly hairy bracteas (scales). Stamens 2 to a flower. Catkin of the female of about 8 or 10 flowers. Capsules large, nearly sessile, ovate, glabrous. The style, which is short and undivided, remains at the extremity of one of the valves; and, as the capsule becomes quite ripe, its stalk is somewhat elongated. (*Rees's Cyclo.*) Introduced in 1763, and flowering in May. It almost equals *S.* herbàcea in diminutiveness. (*Willd.*)


1346

? *Varieties.* It is probable that *S.* Kitaibeliàna, *S.* U'va-úrsi, and *S.* serpyllifòlia *Scop.*, are only varieties of *S.* retùsa *L.* (*Borrer* in his list.)

✻ 157. *S.* KITAIBELIA'NA Willd. Kitaibel's Willow.

Identification. Willd. Sp. Pl., 4. p. 683.; Smith in Rees's Cyclo., No. 69.; Forbes in Sal. Wob., No. 64.; Wahlenb. Carpat., p. 314. (*Koch.*)
Synonymes. *S.* retùsa *Koch*, β major *Koch Comm.*, p. 63.; ? *S.* U'va-úrsi *Pursh.* (*Borrer* in his list.) It is probable that *S.* Kitaibeliàna is only a var. of *S.* retùsa *L.*
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Sal. Wob., No. 64.; and our *fig.* 64. in p. 1616.

Spec. Char., &c. Leaves obovate, lanceolate, entire, emarginate; glabrous and shining above. Catkins appearing with the leaves, cylindrical, and many-flowered. Bracteas shorter than the ovate-lanceolate ovary. (*Willd.* and *Smith.*) A very small shrub, with yellowish glabrous branches, spreading close along the ground. A native of the Carpathian Mountains; flowering there in April and May, and, in the willow garden at Woburn Abbey, in April and May, and again in August. Branches dark brown, the young ones shining. Leaves nearly 1 in. long, obovate, lanceolate, entire; emarginate at the tip; very glabrous on both sides, the upper side shining; the under one

showing parallel veins, and being less shining. Introduced in 1823. There are plants at Woburn, Henfield, and Flitwick.

⁂ 158. *S.* U'VA-U'RSI *Pursh.* The Bearberry-*leaved* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 610.; Smith in Rees's Cyclo., No. 77.; Forbes in Sal. Wob., No. 151.
Synonymes. ? Identical with *S.* Kitaibelià*na*. (*Borrer* in his list.) It is probable that *S.* U'va-ûrsi is only a variety of *S.* retùsa *L.* (*Id.*)
The Sexes. The female is noticed in the *Spec. Char., &c.*, below.
Engravings. Sal. Wob., No. 151.; and our *fig.* 151. in p. 1630.

Spec. Char., &c. Stem depressed. Leaves spathulate-obovate, obtuse entire, glabrous; shining above, glandular at the margin beneath. Stipules none. Catkins lax. Bracteas oblong, fringed. Ovary stalked, ovate, glabrous. Style deeply divided. Stigmas two-lobed. A beautiful little species, with all the appearance of *A*rctostáphylos U'va-ûrsi in habit, as well as in the form of its leaves. (*Pursh.*) A native of Labrador. Introduced in ? 1811, and flowering in April and May. This was possessed alive by Mr. G. Anderson.

⁂ 159. *S.* SERPYLLIFO'LIA *Scop.* The Wild-Thyme-leaved Willow.

Identification. Scop. Carn., No. 1207.; Willd. Sp. Pl., 4. p. 684.; Hayne Abbild., p. 325.; Smith in Rees's Cyclo., No. 71.; Forbes in Sal. Wob., No. 65.
Synonymes. *S.* retùsa *Koch*, γ *Koch Comm.*, p. 63. It is probable that *S.* serpyllifòlia *Scop.* is only a variety of *S.* retùsa *L.* (*Borrer* in his list.)
The Sexes. The male is figured in *Sal. Wob.*, the female in *Hayne Abbild.*
Engravings. Scop. Carn., t. 61. "Scopoli's figure throws no great light on the" species. (*Smith* in *Rees's Cyclo.*) Sal. Wob., No. 65.; our *figs.* 1347, 1348.; and *fig.* 65. in p. 1616.



1347



1348

Spec. Char., &c. Leaves ovate, or ovate-lanceolate, acute, entire, glabrous, shining above. Catkins oblong, of few flowers. Capsules elliptic, glabrous. Stigmas sessile. (*Smith* in *Rees's Cyclo.*) A native of the high mountains of France, Italy, and Switzerland; flowering in May. Introduced in 1818. Haller, Allioni, Villars, and other botanists, took this for a variety of *S.* retùsa; but it appears to be widely different, the leaves being nearly three times smaller, and always acute. A very curious little plant, only 1 in. or 2 in. high, of which there are specimens at Henfield, in the Chelsea Botanic Garden, and in the arboretum of Messrs. Loddiges.

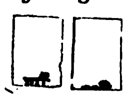
⁂ 160. *S.* CORDIFO'LIA *Pursh.* The heart-leaved *Labrador* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 611.; Smith in Rees's Cyclo., No. 72.; Forbes in Sal. Wob., No. 143. p. 277.
Engravings. Sal. Wob., No. 143., a leaf; and *fig.* 143. in p. 1630.

Spec. Char., &c. Stem depressed. Leaves oval, rather acute, entire, reticulated with veins, heart-shaped at the base; glabrous above, pale, with a hairy rib and margin beneath. Stipules half-heart-shaped. Native of Labrador. In general habit it resembles *S. Myrsinites.* (*Pursh.*) A native of North America, in Labrador. Introduced in 1811, and flowering from April till June. Koch observes of this species, that it is very similar to *S.* Waldsteinià*na* Willd., and differs only in the leaves being strictly entire. The leaves, when young, are sprinkled with villose hairs, but soon become glabrous, except at the edge.

Group xxii. *Herbàceæ* Borrer.

Very low Shrubs, scarcely rising an Inch above the Ground.



There are only two species in this group, the characteristics of which will be found in their specific characters.

⁂ 161. *S.* HERBA'CEA *L.* The herbaceous-*looking* Willow.

Identification. Lin. Sp. Pl., 2445.; Willd. Sp. Pl., 4. p. 682.; Hayne Abbild., p. 233.; Smith in Rees's Cyclo., No. 66.; Koch Comm., p. 63.; Smith Eng. Bot., t. 1907.; Eng. Fl., 4. p. 199.; Forbes in Sal. Wob., No. 63.; Hook. Br. Fl., ed. 3.; Mackay Fl. Hibern., pt. 1. p. 253.; Host Sal. Austr., 1. p. 32.; Pursh Fl. Amer. Sept., 2. p. 617.
The Sexes. Both sexes are described in *Eng. Fl.*, and figured in *Sal. Wob.*, *Hayne Abbild.*, and

Host Sal. Austr.: in *Eng. Bot.*, the female, in fruit and flower; and bractea (scale) of the male. Both sexes were living, in 1836, in the Twickenham Botanic Garden.
Engravings. Hayne Abbild., t. 175.; Eng. Bot., t. 1907.; Sal. Wob., No. 62.; and Host Sal. Austr., 1. t. 104.; our *fig.* 1349.; and *fig.* 62. in p. 1615.

Spec. Char., &c. Leaves orbicular, serrated, reticulated with veins; very glabrous and shining on both sides. Ovary stalked, ovate-lanceolate, glabrous. (*Smith Eng. Fl.*) A native of Britain, on the Welsh and Highland mountains; flowering there in June, but, in the willow garden at Woburn Abbey, before the expansion of the leaves. It is a native, also, of various parts of Europe; also, according to Pursh, of North America. In the *Companion to the Botanical Magazine*, it is stated that *S.* herbàcea exceeds in the elevation of its habitat every other shrub in Britain (p. 89.); and that 'few hills of 800 or 900 yards in Britain are without *S.* herbàcea, whilst *S.* reticulàta is probably limited to the Scottish Highlands, and not very plentiful there." (p. 222.) *S.* herbàcea is the least of British willows, and, according to Sir J. E. Smith, the least of all shrubs. Dr. Clarke, in his *Scandinavia*, calls it a perfect tree in miniature; so small, that it may be taken up, and root, trunk, and branches spread out in a small pocket-book. According to Hooker (*Br. Fl.*, ed. 2.), it is not "so small as is generally supposed, for its stems divide and creep below the surface of the earth, scarcely rising 1 in. above it." In ed. 3., it is stated, on the authority of Dr. Graham, that, "in the Botanic Garden of Edinburgh it has acquired a prostrate woody stem, 2 ft. to 3 ft. long, and as thick as the little finger." Under the head *Varieties*, we have noticed some plants which may belong to this species, and which have stems 2 ft. or 3 ft. high. The leaves of *S.* herbàcea are employed, in Iceland, in the tanning of leather. (*Lindl. Nat. Syst. Bot.*) *S.* herbàcea is called by the Laplanders the ptarmigan leaf. (*Wahlenberg*, quoted in *Eng. Fl.*) In Switzerland, M. Alphonse De Candolle observes, "some species of willow (*S.* retùsa, herbàcea, and reticulàta) spread over the uneven surface of the soil; and, as their branches are often covered with the earth, which the heavy rains wash over them, they present the singular phenomenon of trees which are more or less subterranean. The extremities of these branches form, sometimes, a kind of turf; and the astonished traveller finds himself, as we may say, walking on the top of a tree. The *Sàlix* herbàcea is the species that most frequently presents this remarkable appearance, because it generally grows on steep slopes of loose soil, particularly among the fragments of schistus, that are easily penetrated by the melting snow and the rain." (*Gard. Mag.*, xii. p. 235.) There are plants at Henfield.


1349

? *Varieties.* "A very remarkable kind of willow, from Sutherland, which has all the characters of *S.* herbàcea, except that it grows 2 ft. high, has been sent to me by Dr. Graham, and is now alive in my garden." (*Borrer* in a letter.) An unusually large variety was found by Mr. Templeton on the top of Slieve-Nance, in the county of Antrim, Ireland, similar to some of the large varieties gathered by Mr. M'Nab of Edinburgh on the mountains of Sutherland. Mr. Moore lately sent Mr. Mackay very luxuriant specimens from Dark Mountain, in the county of Derry, Ireland. (*Fl. Hibern.*, pt. 1. p. 253.)

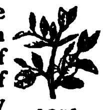
162. *S.* POLA'RIS *Wahlenb.* The Polar Willow.

Identification. Wahlenb. Suec., p. 636.; Fl. Lapp., p. 261.; Koch Comm., p. 64.; Forbes in Sal. Wob., No. 63.
The Sexes. The female is described and figured in *Sal. Wob.*
Engravings. Wahl. Fl. Lapp., t. 13. f. 1.; Sal. Wob., No. 63.; our *figs.* 1350. and 1351.; and *fig.* 63. in p. 1615.

Spec. Char., &c. Leaves ovate, very obtuse, nearly entire, glabrous. Catkins of few flowers. Stem filiform, or thread-shaped. (*Wahlenberg Fl. L.*) A



1350



1351

native of Lapland; flowering there in July, and, in the willow garden at Woburn Abbey, in April, and again in July. Introduced in 1820. The branches and leaves of this species are more tender during the spring than those of *S.* herbàcea; the stem is almost filiform. Leaves broadly ovate, or somewhat roundish, ovate, or obovate; hardly ever so narrow as to be called oblong; and shining on both sides. Mr. Forbes says this plant bears a strong affinity to *S.* herbàcea; but that the silky germens and glaucous leaves clearly show it to be distinct. There are plants at Henfield.

Group xxiii. *Hastàtæ* Borrer.

Low Shrubs, with very broad Leaves, and exceedingly shaggy and silky Catkins. (Hook Br. Fl.)



■ 163. *S.* HASTA'TA *L.* The halberd-*leaved* Willow.

Identification. Lin. Sp. Pl., 1443.; Fl. Lapp., ed. 2., 293.; Willd. Sp. Pl., 4. p. 664.; Smith in Rees's Cyclo., No. 22.; Forbes in Sal. Wob., No. 35.

Synonyme. *S.* hastàta *Koch*, part of, and, if the kinds indicated below as varieties be admitted as such, all of Koch's *S.* hastàta, except *S.* Wulfeni*àna* Willd., Koch Comm., p. 42.

The Sexes. The female is described and figured in *Sal. Wob.* Smith has noted in *Rees's Cyclo* that he had not seen male flowers.

Engravings. Lin. Fl. Lapp., ed. 2. t. 8. f. 9.; Sal. Wob., No. 35.; our *fig.* 1352.; and *fig.* 35. in p. 1611.

Spec. Char., &c. Leaves ovate, acute, serrated, undulated, crackling, glabrous; heart-shaped at the base, glaucous beneath. Stipules unequally heart-shaped, longer than the broad footstalks. Catkins very woolly. Ovary lanceolate, glabrous, on a short stalk. (*Smith* in *Rees's Cyclo.*) A native of the mountains of Lapland. It is said that Messrs. Lee and Kennedy first brought it into this country, in about 1780. It rises to a small spreading tree, and flowers in April or May. Branches blackish, hairy when very young only. Leaves 3 in. long, and about half as wide. (*Id.*) It generally attains the height of 4 ft. to 5 ft. (*Forbes.*) Koch, viewing the species as comprising the varieties indicated below and *S.* Wulfeni*àna* Willd., has given the geographical distribution of it as follows:— Moist places, and by rivers in the alpine and subalpine regions of Savoy, Switzerland, Germany, and Carpathia, Sweden, and Britain. Its most certain British station seems that discovered by Mr. F. Drummond, "by a small stream that passes through the sands of Barrie, near Dundee." (*Bor.*) In the north of Sweden, it inhabits the bogs of the lower regions and plains. *S.* malifòlia *Smith*, indicated below as a variety of *S.* hastàta, is the kind of the latter that is indigenous to Britain. Koch, according to his view of the contents of *S.* hastàta as a species, has ascribed to it a variousness in the form of the leaf of from lanceolate to ovate, with a heart-shaped base.



1352

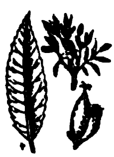
Varieties.

■ S. *h.* 2 *serrulàta.* — Leaves broadly ovate, heart-shaped at the base; synon. *S.* hastàta *Willd. Sp. Pl.*, iv. p. 664. But Wahlenberg has accurately remarked that the description relates to a shoot devoid of flowers: the same kind, in a flower-bearing state, is the *S.* serrulàta *Willd. Sp. Pl.*, iv. p. 664. (*Koch Comm.*, p. 43.) This variety of Koch's we consider as blended in our first, or typical, kind. Willdenow has given Lapland as the native country of both his *S.* hastàta

and *S.* serrulàta: the latter is registered as introduced into Britain in 1810.

■ S. *h.* 3 m*alifòlia*; *S.* malifòlia *Smith Eng. Bot.*, t. 1617., *Willd. Sp. Pl.*, iv. p. 676., *Forbes* in *Sal. Wob.*, No. 36.; *S.* hastàta, part of, *Koch Comm.*, p. 43.; *S.* hastàta *Hook. Br. Fl.*, ed. 2.; *S.* hastàta *Borrer* in a letter.— The female is figured in *Sal. Wob.* and in *Eng. Bot.*, where Smith notes that he had not seen the catkins of the male. For a leaf, see our *fig.* 36. in p. 1611. Leaves elliptic oblong, toothed, wavy, thin and crackling, very glabrous. Stipules heart-shaped, about equal to the footstalks. Bracteas obovate, bearded. Ovary lanceolate, glabrous, on a short glabrous stalk. (*Smith Eng. Fl.*) According to Koch, the leaves are obovate-oblong, serrated with crowded and deepish teeth. (*Comm.*, p. 43.) Sir J. E. Smith, who considered this sort as a distinct species, described it as having an aspect "altogether singular among our British willows, resembling some sort of apple tree rather than a willow." The stem is from 3 ft. or 4 ft. to 6 ft. high, crooked, with numerous irregular, spreading, crooked, or wavy branches, most leafy about the ends; their bark blackish; the young ones hairy. There are plants of *S.* hastàta and *S.* h. *malifòlia* at Woburn and Flitwick.

■ ? ■ S. *h.* 4 *arbúscula*; *S.* arbúscula *Wahl. Fl. Dan.*, t. 1055., *Forbes* in *Sal. Wob.*, No. 138., where there is a figure and description of the female plant (see our *fig.* 1353., also *fig.* 138. in p. 1630.); *S.* arbúscula β *Lin. Fl. Suec.*, p. 348.; *S.* arbúscula γ *Lin. Sp. Pl.*, p. 1545., *Fl. Lapp.*, t. 8. f. *m.* — Leaves lanceolate, serrated with distant, small, and appressed teeth, or almost entire. According to Forbes, the leaves are elliptic-lanceolate, sharply serrated; glabrous above, glaucous and slightly silky beneath; the lower leaves densely silky. Catkins about ½ in. long. Ovary ovate, downy, sessile. Style longer than the linear divided stigmas. The old leaves appear to be nearly glabrous, and to correspond with the figure of *S.* arbúscula in *Flor. Lapp.*, pl. 8. fig. *m.* (*Sal. Wob.*, p. 275.) Brought from Switzerland, by Lord G. W. Russell, in ? 1824; and flowering, in the Woburn salictum, in May. A very pretty little shrub, not above 1 ft. high. (*Ibid.*)



1353

■ 164. *S.* LANA'TA *L.* The woolly-*leaved* Willow.

Identification. Lin. Sp. Pl., 1446.; Fl. Lapp., ed. 2.; Willd. Sp. Pl., 4. p. 688.; Smith in Rees's Cyclo., No. 88.; Smith Eng. Fl., 4. p. 205.; Hook. in Eng. Bot. Suppl., t. 2624.; Wahlenb. Lapp., 259.; Hook. Br. Fl., ed. 2.

Synonymes. *S.* lanàta, the kind No. 2., *Forbes* in *Sal. Wob.*, No. 71.; *S.* lanàta *Koch*, at least part of *Koch Comm.*, p. 53.; ? *S.* càprea *Fl. Dan.*, t. 245. The style is represented as bifid, and the stigmas as bipartite. (*Hooker* in *E. B.*) ? *S.* chrysánthos *Fl. Dan.*, t. 1057., *Forbes* in *Sal. Wob.*, No. 71., the kind No. 1. In *Fl. Dan.*, t. 1057., two styles to a flower are represented, though the plate, in other respects, very faithfully represents my Lapland specimen of *S.* lanàta, sent me by Dr. Wickström. (*Hooker* in *Eng. Bot.*) The *S.* chrysánthos *Fl. Dan.* and the Scottish *S.* lanàta appear to me widely different in foliage, the Scottish kind having its leaf much more orbicular, and generally heart-shaped at the base. (*Forbes* in *Sal. Wob.*) *Willd. Sp. Pl.*, 4. p. 704., *Smith* in *Rees's Cycl.*, No. 127.

The Sexes. Both sexes are described and figured in *Eng. Bot. Suppl.*, t. 2624.: both sexes of *S.* chrysánthos *Fl. Dan.* are figured in *Sal. Wob.*

Engravings. Lin. Fl. Lapp., ed. 2., t. 8. f. x., t. 7. f. 7.; Wahl. Lapp., t. 16. f. 1.; Eng. Bot. Suppl. t. 2624.; Sal. Wob., No. 71., the kind No. 2., a leaf; Fl. Dan., t. 245. ? 1057.; our *fig.* 1354.; and *fig.* 71. No. 2. in p. 1617.

Spec. Char., *&c.* Leaves roundish ovate, pointed, entire; shaggy on both surfaces; glaucous on the under one. Ovary sessile, oblong, glabrous. Styles four times as long as the blunt divided stigmas. (*Smith Eng. Fl.*) Catkins clothed with long, yellow, silky hairs. Ovary nearly sessile, lanceolate, longer than the style. Stigmas undivided. (*Hooker* in *Eng. Bot. Suppl.*) Capsule upon a stalk that is longer than the gland. Stigmas entire. (*Koch Comm.*, p. 53.) Stamens 3 to a flower; in some instances 2; the filaments, in not a few instances, combined to a greater or less extent. (*Hooker* in *E. B. S.*) A native of Lapland, the Faro Isles, and Sweden; and,



1354

perhaps, other parts of the north of Europe, besides Scotland, in which country it has been found in two localities; one, Glen Callater, where it was found by Mr. G. Don, who was the first to discover the species in Scotland; the other, the Clova Mountains, where Mr. T. Drummond discovered it on rocks, in sparing quantity. It flowers in May. The figures in *Eng. Bot. Suppl.*, dated February, 1830, had been partly prepared from a plant cultivated in the Chelsea Physic Garden, that had been originally brought from the Clova Mountains. The following traits are derived from Smith's detailed description in *Eng. Fl.*: — "Stem 3 ft. or 4 ft. high, with numerous thick distorted branches, downy when young. Leaves broader than those of any other British willow except *S.* càprea, on shortish stout footstalks; elliptic or roundish, with a short oblique point; entire, though somewhat wavy; from 1½ in. to 2½ in. long, occasionally heart-shaped at the base; sometimes more obovate, inclining to lanceolate, and the earlier ones much smaller: all of hoary or grey aspect, being covered, more or less completely, with long, soft, silky, shaggy hairs, especially the upper surface; the under one is more glaucous, beautifully reticulated with veins. Catkins terminal, large, and very handsome, bright yellow: those of the female proceed from lateral buds." Dr. Wahlenberg considers this species as "the most beautiful willow in Sweden, if not in the whole world." The splendid golden catkins at the ends of the young shoots light up, as it were, the whole bush, and are accompanied by the young foliage, sparkling with gold and silver. It yields, also, more honey than any other salix. Grafted standard high, it would make a delightful little spring-flowering tree for suburban gardens. There are plants at Henfield, and in the Goldworth Arboretum.

Varieties, according to Koch, in *Koch Comm.*, p. 53.

- S. *l.* 2 *glabréscens*; *S.* chrysánthos *Vahl Fl. Dan.*, vi. t. 1057. (*Koch Comm.*, p. 53.) — Leaves glabrous in a great degree.
- S. *l.* 3 *glandulòsa* Wahlenb. Fl. Lapp., t. 16. f. 1. (*Koch Comm.*) — Leaves sublanceolate, glabrous in a great degree, tooth with glanded teeth.
- ? S. *l.* 4 *depolìta* Koch; *S.* depréssa *Lin. Fl. Suec.*, No. 899., *Fl. Lapp.*, No. 361. t. 8. fig. n., *Wahlenb. Fl. Lapp.* (*Koch Comm.*), *Lin. Fl. Suec.*, ed. 2., 352., *Fl. Lapp.*, ed. 2., 297. t. 8. f. *n.* (*Smith* in *Rees's Cyclo.*)

If *S.* chrysánthos *Fl. Dan.* be admitted as a variety of *S.* lanàta *L.*, the question as to its synonymes stated above may be deemed unnecessary.

Group xxiv. *Miscellàneæ* A.

Kinds of Sàlix *described in* Sal. Wob., *and not included in any of the preceding Groups.*



✝ 165. *S.* ÆGYPTI'ACA *L.* The Egyptian Willow.

Identification. Lin. Sp. Pl., 1444.; Willd. Sp. Pl., 4. p. 686., excluding the references to Pallas and Gmelin; Smith in Rees's Cyclo., No. 82.; Forbes in Sal. Wob., No. 146.

Synonymes. Calaf and Ban, *Alpin. Ægypt.*, 61. t. 62.

The Sexes. The male is mentioned in the description in *Rees's Cyclo.*

Engravings. Alpin. Ægypt., t. 62.; Sal. Wob., No. 146.; and *fig.* 146. in p. 1630.

Spec. Char., &c. Leaves somewhat toothed, elliptic, oblong, veiny; rather glabrous above, glaucous and more or less hairy beneath. Stipules half-heart-shaped. Branches glabrous, and angular and furrowed. Catkins sessile, very hairy. Alpinus describes this species as a small tree. The leaves are on rather short footstalks, broad at the base, without glands, usually 3 in. or 4 in. long, and nearly 2 in. broad; acute, rather distinctly toothed; glaucous and densely downy when young. (*Rees's Cyclo.*, art. Sàlix, No. 82.) A native of Egypt, where a water is said to be procured from the catkins by distillation, which is considered antipestilential. (*Ibid.*)

? ? ? ? 166. *S.* ALPI`NA ? *Forbes.* The alpine Willow.

Identification. ? Forbes Sal. Wob., No. 149. Mr. Forbes has not quoted an authority for the name, though he has noted that he was indebted to Professor Don for a specimen.
Engravings. Sal. Wob., No. 149. ; and our *fig.* 149. in p. 1630.

Spec. Char., &c. Leaves obovate, elliptic, entire; margins slightly revolute, densely silky on the upper surface; glaucous, reticulated, hairy underneath. Branches slender, and very black when dried. (*Sal. Wob.*, p. 279.) " Dr. Graham kindly sent me living cuttings of a willow with this name, alpina, from the Edinburgh Garden, in 1831; but I have not succeeded in cultivating it. I think it much resembled *S.* cordifòlia *Pursh*, which I formerly had growing.

167. *S.* BERBERIFO`LIA *Pall.* The Berberry-leaved Willow.

Identification. Pall. Fl. Ross., 1. p. 2. 84. t. 82.; Itin., 3., Append., 759. t. K. k. f. 7.; Willd. Sp. Pl., 4. p. 683.; Smith in Rees's Cyclo., No. 68.; Forbes in Sal. Wob., No. 140.
The Sexes. The male is figured in *Sal. Wob.*; the female is noticed in the *Specific Character*.
Engravings. Pall. Fl. Ross., 1. p. 2. t. 82.; Itin. Append., t. K. k. f. 7.; Gmel. Sib., 1. t. 35. f. 3.; Sal. Wob., No. 140.; our *fig.* 1355.; and *fig.* 140. in p. 1630.



1355

Spec. Char., &c. Leaves obovate, bluntish, with deep tooth-like serratures, glabrous, shining, ribbed, and reticulated with veins on both sides. Capsules ovate, glabrous. (*Smith* in *Rees's Cyclo.*) A native of Daüria, in rocky places on the loftiest mountains; growing, along with *Rhododéndron* chrysánthum, near the limits of perpetual snow. The stems are branched and diffuse. Leaves with disks not much above ½ in. long, and so deeply toothed as to be almost pinnatifid; and very happily compared to those of the berberry. (*Smith.*) A variety with elongated leaves is found in Kamtschatka. Introduced in ? 1824, and flowering in May.

168. *S.* TETRASPE`RMA *Roxb.* The four-seeded Willow.

Identification. Roxb. Corom., 1. p. 66.; Willd. Sp. Pl., 4. p. 657.; Smith in Rees's Cyclo., No. 9.; Forbes in Sal. Wob., No. 31.
The Sexes. Both sexes are figured in *Rox. Cor.* and in *Sal. Wob.*
Engravings. Roxb. Corom., 1. t. 97.; Sal. Wob., No. 31.; and *fig.* 31. in p. 1609.

Spec. Char., &c. Leaf oblong-lanceolate, with the upper part acuminate; serrated, glabrous, glaucous beneath. Flowers blossoming after the protrusion of the leaves. Male flower having 6 stamens. Ovary ovate, stalked. Style short. Wild in mountainous places in India, by the banks of rivers. (*Willd. Sp. Pl.*) A native of India. Introduced in 1796, or soon afterwards. In its native country, it forms a middling-sized tree, with an erect trunk, but short, and as thick as a man's body, bearing a very large branching head, with twiggy branches. It had not flowered in the Woburn collection anteriorly to the date of the publication of that work in 1829.

169. *S.* ULMIFO`LIA *Forbes.* The Elm-leaved Willow, *or Sallow.*

Identification. Forbes in Sal. Wob., No. 158.
The Sexes. The female is described in *Sal. Wob.*, and in the *Specific Character.*

Spec. Char., &c. Stem erect. Leaves ovate-elliptic, serrated; glaucous beneath, shining above: a little heart-shaped and unequal at the base, acute at the tip. Stipules large, half-heart-shaped, serrated and glandular towards the stem. Ovary nearly sessile, ovate-lanceolate, glabrous. Style elongated, glabrous. Stigmas notched. Bracteas obovate, dark in their upper half, and fringed. (*Sal. Wob.*, p. 286.) A native of Switzerland. Introduced in 1821, and flowering, in the Woburn salictum, in April, and again in August. An upright bushy tree, attaining the height of 18 ft. or more. Branches round, pubescent, of a dark brown colour, and marked with many small red spots towards autumn. The leaves from 2 in. to 2½ in. long, and 1½ in. in breadth, of an ovate-elliptic shape, sometimes hollowed out at the base; finely serrated; green and shining above, glaucous and besprinkled with minute hairs underneath. Footstalks above ½ in. long, villous, like the midrib. Catkin slender, 1½ in. long when at maturity. Three applications of the epithet ulmifòlia, besides the above, have been made; namely, *S.* ulmifòlia *Thuill. Paris.*, 518., *De Cand. Fl. Fr.* 5. p. 340. (*Koch Comm.*, p. 37.; *Smith Eng. Fl.*); *S.* ulmifòlia *Schl.* (*Steud. Nom. Bot.*); and *S.* ulmifòlia *Hort. Berol.* (*Koch Comm.*, p. 42.) Koch has referred the first of these to *S.* càprea, and Smith to *S.* aurita; the second is referred, in *Steud. Nom. Bot.*, to *S.* nigricans *Smith*; the third by Koch, to his *S.* phylicifòlia. ? Is Mr. Forbes's distinct from all these. *S.* ulmifòlia *Thuill.* is registered in *Hort. Brit.*, No. 24006., as having been introduced from Switzerland in 1821.

170. *S.* VILLO`SA *Forbes.* The villous-*leaved* Willow.

Identification. Forbes in Sal. Wob., p. 183.
The Sexes. The plant in the Woburn collection had not flowered in 1829.
Engravings. Sal. Wob., t. 92.; and *fig.* 92. in p. 1619.

Spec. Char., &c. Leaves obovate-lanceolate, finely serrated towards the tip; rather slightly toothed, and tapering towards the base; upper surface shining, and minutely covered with small hairs; beneath, glaucous, reticulated, and slightly hairy. (*Sal. Wob.*, p. 183.) A small shrub, with slender, greenish yellow, villous branches, which are sometimes marked with yellow dots; growing here to the height of 2 ft. The leaves are from 1 in. to 1½ in. long, obovate-lanceolate, tapering towards the base, minutely serrated at their tip, but generally finely toothed in the middle: often appearing as entire; their upper surface shining, besprinkled with very minute hairs; under glaucous, reticulated, covered with small shining hairs. The whole substance of the leaves is very thin and tender. Mr. Forbes cannot unite this with the hitherto described species; the leaves and slender growth of the branches being very different from any other species of the genus. It appears rather impatient of cold; and, as it suffers during the winter, that may be one reason why it has not yet flowered. A *S.* villòsa *Schleicher* is registered in Steudel's *Nomenclator Botanicus*; and such is likely to be indigenous to Schleicher's country of residence, Switzerland, whether the kind noticed above is identical with it, or not.

Group xxv. *Miscellàneæ* B.

Kinds of Sàlix introduced, and of many of which there are Plants at Messrs. Loddiges's, but which we have not been able to refer to any of the preceding Groups.



Several of the names in this group are Schleicher's, Koch's estimate of which we have already given in p. 1486. Many of the others are probably of kinds described as belonging to preceding groups; because, when the salictum at Woburn was planted, the entire collection of Messrs. Loddiges, as it existed in 1827, was included. We have, however, given the names and descriptions below, that nothing might be wanting to render our article on *Sàlix* as complete as the nature of the recorded information on that genus will admit.

■ 171. *S.* ALBE'SCENS *Schl.* The whitish-*leaved* Willow.

Identification. Schleicher Cat.; Lodd. Cat., ed. 1836.
Synonyme. S. stylòsa ♂ *Dec.*

Description, &c. There are living plants in the Hackney arboretum, which appear to belong to Cinèreæ. It is mentioned in the *Hortus Britannicus* as a native of Switzerland, introduced in 1824.

■ 172. *S. A*LNIFO'LIA *Host.* The Alder-leaved Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. This kind appears to belong to the group Cinèreæ. There were living specimens in the Hackney arboretum, and in the Cambridge Botanic Garden, in 1836.

₮ 173. *S.* AMMANNIA'NA Willd. Ammann's Willow.

Identification. Willd. Sp. Pl., No. 16.; Smith in Rees's Cycl., No. 21.; ? Walt., on the authority of Steud.
Synonymes. S. Myrsinìtes Hoffm. Sal., 17, 18, 19., on the authority of Willd.; *S. hastàta Hopp.*, not L.
Engravings. Hoffm. Sal., t. 17, 18, 19.; Hayne Abbild., t. 116.
Spec. Char., &c. Leaves oblong-elliptic, acute, serrated, glabrous, glaucous beneath. Stipules ovate, permanent, toothed. Catkins about 1 in. long, with elliptic, obtuse, hairy scales; appearing before the leaves. (*Smith*, adapted.) A tree with brown branches, downy when young; a native of the Salzburg and Carinthian Alps. According to *Hort. Brit.*, it was introduced from Austria in 1821.

₮ 174. *S.* ANGUSTA'TA *Pursh.* The taper-*leaved American* Willow.

Identification. Pursh Fl. Amer. Sept., No. 21.; Smith in Rees's Cyclo., No. 27.
Spec. Char., &c. Leaves lanceolate, acute, very long, gradually tapering at the base, finely serrated, quite glabrous, scarcely paler beneath. Stipules half-heart-shaped. Catkins erect, smoothish, appearing before the leaves. (*Pursh.*) A low tree, found in shady woods on the banks of rivers, in New York and Pennsylvania; flowering in March. It has very long leaves, and resembles *S. prinöìdes.* (*Ibid.*) Introduced in 1811.

■ 175. *S.* ANGUSTIFO'LIA *Willd.* The narrow-leaved *Caspian* Willow.

Identification. Willd. Sp. Pl., 4. p. 699.; Smith in Rees's Cyclo., No. 112.
Synonyme. ? *S. càspica Pall. Fl. Ross.*, 1. p. 274.
Engraving. N. Du Ham., 3. t. 29.
Spec. Char., &c. Leaves linear, very narrow, without stipules, nearly entire, ovate at the base, hoary above, silky beneath. (*Willd.* and *Smith.*) A low shrub, a native of the country near the Caspian Sea. Branches brown. Pallas's plant is said to be glabrous, otherwise his description agrees with that given by Willdenow. (*Ibid.*) Introduced in 1825.

? ■ 176. *S. B*ETU'LINA *Host.* The Birch-like Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. This seems to belong to the group Cinèreæ. There are living plants in the Hackney arboretum, the leaves of which are too long and too narrow to bear much resemblance to those of any kind of *Bétula*; so that the name probably refers to some other part of the plant.

? ■ 177. *S.* CANDI'DULA *Host.* The whitish Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. Leaves in form somewhat resembling those of an elm. Apparently belonging to the group Cinèreæ. There were living plants in the Hackney arboretum, and in the Botanic Garden at Cambridge, in 1836.

? ■ 178. *S.* CANE'SCENS *Lodd.* The hoary Willow.

Identification. Lodd. Cat., ed. 1836.
Spec. Char., &c. Leaves oblong-lanceolate, acute, 2 in. or 3 in. long; glabrous and shining above, white and downy beneath; young leaves hoary on the upper side. Capsules ovate, sessile, downy. There are plants under this name in the Hackney arboretum, which appear to belong to the group Cinèreæ *Borr.*, p. 1553.; and are totally different from *S. canéscens Willd.*, No. 67. in p. 1544, which belongs to the group Glaúcæ *Borr.*, p. 1543.

179. *S.* CERASIFO'LIA *Schl.* The Cherry-leaved Willow.

Identification. Schleicher's Catalogue.

Description, &c. An ornamental shrub, a native of Switzerland. Introduced in 1824.

180. *S.* CHRYSA'NTHOS *Œd.* The golden-flowered *Norway* Willow.

Identification. Œder in Flora Danica, t. 1057.; Willd., No. 102.; Smith in Rees's Cyclo., No. 127.
Synonyme. ? *S.* lanàta var.
Engraving. Fl. Dan., t. 1057.

Spec. Char., &c. Leaves elliptic, acute at each end, entire, downy on both sides. Stipules ovate, entire. Catkins thick, 1½ in. long; the scales clothed with long, shining, gold-coloured hairs. Style divided to the base. (*Smith.*) A native of Finmark, as well as of the Norway alps. A shrub with thick crooked branches, and large shaggy leaves. It takes its name from the gold-coloured hairs on the scales of the catkin.

181. *S.* CINNAMO'MEA *Schl.* The Cinnamon Willow.

Identification. Schl. Cat.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824.

182. *S.* CLETHRÆFO'LIA *Schl.* The Clethra-leaved Willow.

Identification. Schl. Cat.; Lodd. Cat., 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824. There are plants at Messrs. Loddiges's, from which it appears to belong to the group Càpreæ.

183. *S.* CONI'FERA *Wangenh.* The cone-bearing Willow.

Identification. Wangenh. Amer., 123. t. 31. f. 72.; Mühlenb. in Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 240.; Willd. Arb., 347., Sp. Pl., 4. p. 705.; Mühlenb. in Sims et Kön. Ann. of Bot., 2. 67.; Pursh Fl. Amer. Sept., 2. p. 612.; Smith in Rees's Cyclo., No. 130.
Synonyme. *S.* longiróstris *Michx. Fl. Bor. Amer.*, 2. 226.
The Sexes. A female plant, with this name attached, was flowering in the London Horticultural Society's arboretum in the spring of 1835.
Engraving. Wangenh. Amer., t. 31. f. 72.

Spec. Char., &c. Leaves oblong-lanceolate, serrulate with distant teeth; glabrous on the upper surface, even and tomentose on the under one. Stipules lunate, subdentate. Ovaries lanceolate, villous. Style elongated. Stamens deeply cleft. (*Willd.* and *Smith.*) Wild in North America, in shady woods on a gravelly dry soil, from New York to Carolina, where it flowers in April. The cone-like excrescence at the ends of the branches, occasioned by an insect, is not unfrequently found on *S. prinöides* and its allied species. (*Pursh.*) Introduced in 1820.

184. *S.* CORU'SCANS *Willd.* The glittering Willow.

Identification. Willd. Sp. Pl., 4. p. 681.; Smith in Rees's Cycl., No. 64.; Eng. Fl., 4. p. 180.; Host Sal. Austr., 1. p. 28., who has quoted as identical Jacq. Austr., t. 408.
Synonymes. Willdenow has cited, as identical with this, *S.* arbúscula *Jacq. Austr.*, t. 408., and *Host Synops.*, 527.; and remarked that it is close akin to *S.* tenuifòlia *Smith*; and Smith has confirmed this relationship in *Eng. Fl.*, 4. p. 180.: yet Koch has cited (*Comm.*, p. 57.) the *S.* arbúscula *Jacq. Austr.*, t. 408., as a rude and unfaithful figure of *S.* Waldsteiniàna Willd., a kind which Willdenow has stated (*Sp. Pl.*) to be closely related to *S. Myrsinìtes Willd. Sp. Pl.*, and, hence, very different from *S.* tenuifòlia *Smith*; and Koch has besides (*Comm.*, p. 46.) mentioned a doubt whether *S.* corúscans *Willd.* does not belong to *S.* arbúscula *Wahlenb.*, but that he dares not refer it to it, from not having seen an authentic specimen.
The Sexes. Both sexes are described in *Willd. Sp. Pl.*, 4. p. 681.; and both are figured in *Host Sal. Austr.*
Engravings. Jacq. Austr., t. 408.; Host Sal. Austr., t. 94.

Spec. Char., &c. Leaves ovate-elliptic, acute at the tip, tapered to the base; serrate, the lower teeth glanded; glabrous; glossy above, glaucescent beneath. Capsule ovate-lanceolate, glabrous. (*Willd.*) It inhabits the Alps of Styria, Carinthia, and Salsburg. (*Id.*) Willdenow had seen this kind living, and has described it in detail in his *Sp. Pl.* Introduced in 1818.

185. *S.* CYDONIÆFO'LIA *Schl.* The Quince-leaved Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A dwarf shrub, a native of Switzerland. Introduced in 1824. There are plants at Flitwick, and in the Goldworth and Hackney arboretums.

186. *S.* DU'BIA *Hort.* The doubtful Willow.

Description, &c. There are plants under this name in the arboretum at Flitwick House.

187. *S.* ERIA'NTHA *Schl.* The woolly-flowered Willow.

Identification. Schl. Cat.

Description, &c. A low shrub, a native of Switzerland. Introduced in 1823, and flowering in April.

188. *S.* FAGIFO'LIA *Waldst. et Kit.* The Beech-leaved Willow.

Identification. Waldstein et Kitaibel's Pl. Rar. Hung.; Willd., No. 103.; Smith in Rees's Cyclo., No. 128.

Spec. Char., &c. Leaves ovate-elliptic, with a glandular point, serrated, entire at the base; about 1½ in. long; dark green and smooth above, reticulated with hairy veins beneath. Stipules kidney-shaped, with glandular teeth. Branches brown, downy when young. Catkins not observed. (*Willd.*) A native of the Croatian Alps. There are plants in the Cambridge Botanic Garden, and at Messrs. Loddiges's; from the latter of which it appears to belong to the group Cinèreæ.

🌳 189. S. FINMA'RCHICA *Lodd. Cat.* The Finmark Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. A low tree, a native of Sweden. There are plants under this name at Messrs. Loddiges's, which bear some resemblance to S. viminàlis; and at all events are quite different from S. finmárchica *Willd.*, No. 55. in p. 1541. It flowers in April and May.

190. S. FOLIOLO'SA *Afzel.* The many-leaved Willow.

Identification. Afzel. in Linn. Fl. Lapp., ed. 2., p. 295.; Willd., No. 61.; Smith in Rees's Cyclo., No. 73.

Synonymes. ? S. fòlidsa *Loud. Hort. Brit.*, No. 24028., *Sweet's Hort. Brit.*, No. 159.; S. alpina myrtifòlia *Rudb. Lapp.*, 99.; S. arbúscula β *Lin. Sp. Pl.*, 1445.

Spec. Char., &c. Leaves elliptic-ovate, entire, somewhat pointed, smooth, glaucous beneath. Ovary lanceolate, silky, on a long stalk. Stigmas nearly sessile, deeply divided. (*Linn.*) A very low shrub, not exceeding 1 ft. high, with very thin almost pellucid leaves; and short, thick, many-flowered catkins, produced on short lateral branches. A native, according to Linnæus, of sandy fields in the wild part of Lapland, but rare. (*Smith* in *Rees's Cyclo.*) Some botanists consider this synonymous with S. lívida, No. 190.

191. S. FORMO'SA *Willd.* The elegant Willow.

Identification. Willd. Sp. Pl., No. 51.; Smith in Rees's Cyclo., No. 62.

Synonymes. S. glaúca *Willd. Arb.*, 338., ? S. alpina *Scop. Carn.*, ed. 2. vol. 2. p. 255.

Engraving. ? Scop. Carn., vol. 2., t. 61.

Spec. Char., &c. Branches reddish brown. Leaves 1 in. or more in length, a little contracted at the base, finely fringed at the edge; the young ones very silky beneath. Stipules extremely minute. Female catkins scarcely 1 in. long, with lanceolate, fringed scales. (*Willd.*) A native of the Swiss and Carinthian Alps.

192. S. FUSCA'TA *Pursh.* The brown-*stemmed* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 612.; Smith in Rees's Cyclo., No. 110.

Spec. Char., &c. Branches of the preceding year covered with a dark brown or black tomentum. Leaves obovate-lanceolate, acute, somewhat serrated, glaucous beneath, downy when young. Stipules minute. Catkins drooping. Scales obtuse, scarcely hairy on the inside. (*Pursh.*) Found wild, in low overflowed grounds on the banks of rivers, from New York to Pennsylvania; flowering in March or April. (*Id.*)

193. S. GLABRA'TA *Schl.* The glabrous Willow.

Identification. Schleich. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1820. There are living plants in the Hackney arboretum, from which it appears to belong to the group Cinèreæ.

194. S. HETEROPHY'LLA *Deb.* The various-leaved Willow.

Identification. De Bray; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Europe. Introduced into Britain in 1823, and flowering in April and May. There are plants in the Hackney arboretum.

195. S. HU'MILIS *Dec.* The humble Willow.

Identification. De Candolle.

Description, &c. A low shrub, seldom rising above 1½ in. high. Introduced in 1820, and flowering in April.

196. S. JACQUI'NII Host. Jacquin's Willow.

Identification. Host Synops., p. 529.; Wahlenb. Carpat., p. 315.; Koch Comm., p. 61.

Synonymes. S. fúsca *Jacq. Austr.*, t. 409., ? *Hoff. Hist. Sal.*; S. alpina *Scop. Carn.*, 2. 255. t. 61.; S. Jacquiniàna Willd. Sp. Pl., 4. p. 692., Smith in Rees's Cyclo., No. 95., Hayne Abbild., p. 239., Host Sal. Aust., 1. p. 31.

The Sexes. Both sexes are figured in *Hayne Abbild.*, and both in *Host Sal. Aust.*

Engravings. Jacq. Aust., t. 409.; Scop. Carn., 2. t. 61.; Hayne Abbild., t. 181.; Host Sal. Aust., 1. t. 102.

Spec. Char., &c. Leaves elliptic or lanceolate, entire, reticulately veiny on both surfaces, shining, eventually becoming more or less glabrous, ciliate. Catkins upon a twiglet nearly as long as the catkin; leafy in the lower part, leafless in the upper. Capsule (? or ovary) ovate-acuminate, sessile, woolly, eventually upon a very short stalk, and more or less glabrous. Gland reaching higher than the base of the capsule. Style elongated. Stigmas linear, bifid or entire. It only differs from S. Myrsinites *Koch* in having its leaves entire, and mostly, if not always, ciliate at the margin. ? Is it a variety of that species. (*Koch.*) S. Myrsinites of *Koch's Comm.* is equal to the S. Myrsinites *L.*, and S. betulifòlia *Forster*, of this work. S. Jacquinii is indigenous to the highest alpine chains of Carinthia, Carniola, Austria, Carpathia, and Transylvania. (*Koch.*) Introduced in 1818.

197. S. LI'VIDA *Wahlenb.* The livid-*leaved* Willow.

Identification. Wahlenb. Lapp., No. 1169.; Koch Comm., p. 39.

Synonymes. S. arbúscula γ *Lin. Fl. Suec.*, p. 348.; ? S. arbúscula β *Lin. Sp. Pl.*, p. 1446.; S. Starkeàna Willd. Sp. Pl., 4. p. 677., according to specimens from Silesia; ? S. foliolòsa *Afzel.* in *Fl. Lapp.*, ed. 2., p. 295., *Willd. Sp. Pl.*, 4. p. 685.; S. malifòlia *Bess. Galic.*, p. 313., according to the author in *Enum. Pl. Volhyn.*, p. 37.; S. bicolor *Ehrh. Arb.*, 118., *Fries Novit.*, p. 58. (*Koch Comm.*) The S. lìvida *Hook. Fl. Scot.*, and *Smith Eng. Fl.*, 4. p. 1999., once supposed identical with S. lìvida *Wahl.*, has been since referred, in *Hook. Br. Fl.*, ed. 2., to S. vacciniifòlia *Walker*.

Spec. Char., &c. Leaves obovate or elliptical, shortly acuminate, entire except the upper ones, which are serrate with remote blunt teeth; glaucescent or livid rather than glaucous on the under surface; when adult, glabrous. Stipules kidney-shaped. Fructiferous catkins peduncled; the peduncle a short twig bearing one or two leaves. Capsules stalked, tomentose, ovate at the base, lanceolate and long in the remaining part; stalk five times as long as the gland. Style very short. Stigmas ovate, bifid. (*Koch Comm.*, p. 39.) Koch compares it to *S.* aurita, but says that the male catkins are more slender, and the female ones thicker, and with looser flowers. Introduced in 1824, according to *Sweet's Hort. Brit.*

198. *S.* LONGIFO'LIA *Mühlenb.* The long-leaved Willow.

Identification. Mühlenb. Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 238. t. 6. f. 6.; Willd. Sp. Pl., 4. p. 670.; Mühlenb. in Sims et Kön. Ann., 266. t. 5. f. 6.; Pursh Fl. Amer. Sept., 2. p. 613.; Smith in Rees's Cyclo., No. 41.
The Sexes. The male is described.
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 6.; Ann. of Bot., t. 5. f. 6.

Spec. Char., &c. Leaves linear, pointed at each end, very distinctly toothed, glabrous, green on both surfaces. Stipules lanceolate, toothed. Catkins protruded after the leaves. Bracteas rounded, somewhat hairy, mostly so on the inside. Stamens 2. Filaments bearded at the base. (*Pursh*, as quoted by *Smith* in *Rees's Cyclo.*) Gathered on the banks of the Susquehanna; flowering in July. Not above 2 ft. high. Leaves 5 in. to 6 in. long, not ¼ in. wide. The flowering branches sometimes bear broader and shorter foliage. (*Id.*) According to Pursh, the branches are brown, and the branchlets white.

199. *S.* MESPILIFO'LIA *Schl.* The Mespilus-leaved Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824; flowering in April and May. There are plants at Messrs. Loddiges's, from which it appears to belong to the group Cinèreæ.

200. *S.* MURI'NA *Schl.* The Mouse Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824, and flowering in March and April. From the plants at Messrs. Loddiges's, it appears to belong to the group Cinèreæ.

201. *S.* MYRICOI'DES *Mühlenb.* The Myrica-like Willow.

Identification. Mühlenb. Nov. Act. Soc. Nat. Scrut. Berol., 4. p. 235. t. 6. f. 2.; Willd. Sp. Pl., 4. p. 666.; Mühlenb. in Sims et König Ann. of Bot., 263. t. 5. f. 2.; Pursh Fl. Amer. Sept., 2. p. 613.; Smith in Rees's Cyclo., No. 29.
The Sexes. The female is noticed in the *Specific Character.*
Engravings. Nov. Act. Soc. Nat. Scrut. Berol., 4. t. 6. f. 2.; Ann. of Bot., 2. t. 5. f. 2.

Spec. Char., &c. Leaves ovate-lanceolate, acute, about 4 in. long, and 1 in. broad, bluntly serrated, glabrous, glaucous beneath, glanded at the base. Stipules ovate, serrated with glanded teeth. Catkins woolly, about 1½ in. long. Ovary lanceolate, glabrous; its stalk and the bractea remarkably woolly, and the former longer than the gland. Style the length of the divided stigmas.' (*Smith.*) Wild in North America, in wet meadows and woods, from New England to Virginia; flowering in April. A shrub, from 6 ft. to 9 ft. high. (*Pursh* and *Smith.*) According to Pursh, the adult branches are green, and the younger ones purple, and glabrous. Introduced in 1811.

202. *S.* NERVO'SA *Schl.* The nerved-*leaved* Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824. From the plants in the Hackney arboretum, it appears allied to *S.* càprea.

203. *S.* OBTU'SA *Link.* The blunt-*leaved* Willow.

Identification. ? Link.

Description, &c. A low shrub, rarely exceeding 4 ft. high; a native of Switzerland. Introduced in 1820, and flowering in May.

204. *S.* OBTUSIFO'LIA *Willd.* The obtuse-leaved *Lapland* Willow.

Identification. Willd., No. 106.; Smith in Rees's Cyclo., No. 131.
Synonymes. *S.* fòliis oblóngis, &c., *Lin. Fl. Lapp.*, ed. 2., p. 301.; *S.* càprea β *Sp. Pl.*, 1448.; *S.* O'lea sylvéstris, &c., *Rudd. Lapp.*, 99.

Spec. Char., &c. Leaves oblong-lanceolate, wedge-shaped at the base. Frequent in the woods and mountains of Lapland. (*Linnæus.*) A slender shrub, not unfrequently arborescent. Young branches slender, clothed with long silky down. Leaves rather more than 2 in. long, ¾ in. wide; green, shining, slightly downy above, with many curved parallel veins; glaucous, and not more downy, beneath. Footstalks downy. It is very remarkable, that, contrary to the nature of most willows, the lower blunter leaves of each branch are furnished with minute distant teeth, or shallow serratures; while the upper and pointed ones are quite entire. Except the teeth of the leaves, it comes nearer to *S.* Lappònum than any other kind of willow. (*Smith* in *Rees's Cyclo.*)

205. *S.* OBTU'SI-SERRA'TA *Schl.* The obtusely-serrated-*leaved* Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824. The plants in the Hackney arboretum appear allied to *S.* càprea.

206. *S.* PALLE'SCENS *Schl.* The pale Willow.

Identification Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1823 The plants at Hackney appear allied to *S.* càprea.

▲ 207. *S.* PALUDO'SA *Lk.* The Marsh Willow.

Identification. Link Enum.; Sweet Hort. Brit., No. 73.; Lodd. Cat., ed. 1836.

Description, &c. From the plants bearing this name in the Hackney arboretum, this kind appears to belong to the same group as *S.* palléscens.

▲ 208. *S.* PERSICÆFO'LIA *Hort.* The Peach-tree-leaved Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. The plant bearing this name in the Hackney arboretum appears allied to *S.* rùbra.

▲ 209. *S.* PYRENA'ICA *Gouan.* The Pyrenean Willow.

Identification. Gouan Illust., 77., excluding the synonymes; Willd., No. 86.; Smith in Rees's Cyclo., No. 107.

Spec. Char., &c. Stems quite prostrate, branched, and smooth. Leaves 1 in. long, and nearly ½ in. wide; bright green and shining above; remarkably woolly about the margin, which gives them a peculiar and characteristic appearance. When young, they are hairy all over. Footstalks broad, channeled, rather short, smooth, yellowish, without stipules. Female catkins 2 in. long, slender, rather lax, on leafy stalks. Scales linear-obovate, long, fringed with copious long hairs. Germens extending rather beyond the scales, and clothed with similar hairs. Stigmas long and linear. (*Smith* in *Rees's Cyclo.*) A native of the Pyrenees. Introduced in 1823, and flowering in May.

▲ 210. *S.* PYRIFO'LIA *Schl.* The Pear-tree-leaved Willow.

Identification. Schl. Cat.; Lodd. Cat., ed. 1836.

Description, &c. A shrub, a native of Switzerland. Introduced in 1824, and, from the plants at Hackney, apparently belonging to Cinèreæ.

▲ 211. *S.* RECURVA'TA *Pursh.* The recurved-*catkined* Willow.

Identification. Pursh Fl. Amer. Sept., 2. p. 609.; Smith in Rees's Cyclo., No. 99.
The Sexes. The female is noticed in the *Specific Character.*

Spec. Char., &c. Leaves obovate-lanceolate, acute, glabrous, entire; glandular at the margin, glaucous beneath; the young ones silky. Stipules none. Catkins protruded before the leaves, recurved. Ovary ovate, somewhat stalked, the length of the hairs of the bracteas. Style very short. Stigmas divided. Wild in shady woods in North America, among the mountains of New Jersey and Pennsylvania; flowering in April. A low shrub. Branches brown, glabrous. Buds yellow. Bracteas tipped with black. (*Pursh* and *Smith.*) Introduced in 1811. According to Pursh (p. 612.), it bears considerable resemblance to *S.* rosmarinifòlia.

▲ 212. *S.* SALVIÆFO'LIA *Link.* The Sage-leaved Willow.

Identification. Adopted from Link in Willd Sp. Pl., 4. p. 688.; Smith in Rees's Cyclo., No. 87.; Koch Comm., p. 34.
Synonymes. *S.* pàtula *Seringe Sal. Helv.*, p. 11., *Spreng. Syst.*, *Sweet Hort. Brit.*; *S.* oleifòlia *Ser. Sal. exsicc.*, No. 1.; *S.* oleæfòlia *Vill. Dauph.*, 3. p. 784., according to *Willd. Sp. Pl.*, 4. p. 709.; *S.* Fluggeàna Willd. Sp. Pl., 4. p. 709., according to a specimen from Flugge himself in the herbarium of Mertens, Smith in Rees's Cyclo., No. 139.
The Sexes. The female is described in the *Specific Character*, and in Willdenow's description of *S.* Fluggeàna.

Spec. Char., &c. Leaves oblong-lanceolate, acute, tapered to the base, obsoletely denticulated, hoary and tomentose, and wrinkled with veins on the under surface; lower ones obtuse. Stipules half-heart-shaped, acute. Catkins sessile, arched, attended by some scale-shaped leaves at the base. Capsule ovate-lanceolate, tomentose, stalked; the stalk as long again as the gland. Style short. Stigmas oblong, nearly entire. (*Koch.*) Wild in Portugal, the south of France, and Switzerland. In Dauphiné, Villars says that it serves as a stock on which to graft *S.* vitellìna. Smith mentions that the trunk is about 10 ft. or 12 ft. high; the leaves about 1½ in. or 2 in. long, and somewhat revolute; and the branches dark brown, hairy when young, and very brittle. Smith describes *S.* salviæfòlia and *S.* Fluggeàna as distinct species; but it does not appear that he had seen specimens of either. *S.* Fluggeàna Willd. is stated in the *Hortus Britannicus* to be a native of the south of France, and introduced in 1820.

▲ 213. SCHRADERIA'NA Willd. Schrader's Willow.

Identification. Willd. Sp. Pl., 4. p. 695.; Smith in Rees's Cyclo., No. 104.; Koch incidentally in Comm., p. 46.
Synonymes. *S.* discolor *Schrad. Hort. Gött. MSS.*, as quoted by Willd. It is noticed by Koch (*Comm.*, p. 46.), as a variety of a kind that is cultivated, in most German gardens, under the erroneous name of *S.* bicolor *Ehrhart.*

Spec. Char., &c. Leaves elliptical, acute; finely downy on both surfaces, glaucous on the under one; slightly serrated towards the point. Stipules very small. Catkins protruded rather earlier than the leaves, ovate, hairy. (*Smith.*) It approaches, in habit and size of leaves, *S.* Croweàna and *S.* bicolor; but the foliage is always more or less clothed on both surfaces with silky hairs; and the two stamens are distinct. The footstalks are slender, elongated, sometimes having two minute rounded stipules at the base, or, in their stead, a pair of glands. (*Id.*) Introduced in 1820.

▲ 214. *S.* SEPTENTRIONA'LIS *Host.* The northern Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. From the plants in the Hackney arboretum, this kind appears to belong to the group Cinèreæ. Mr. Borrer had cuttings of *S.* nigricans *Smith*, from Messrs. Loddiges, under the name of *S.* septentrionàlis.

215. *S.* SILESI'ACA *Willd.* The Silesian Willow.

Identification. Willd. Sp. Pl., 4. p. 660.; Smith in Rees's Cyclo., No. 17.; Koch de Sal. Europ. Comm., p. 40.
The Sexes. The female is noticed in the *Specific Character.*
Engraving. Hayne Abbild., t. 164.

Spec. Char., &c. Leaves obovate, with an acuminate point; the lowest ones blunt; waved and serrated in the margin; under surface of the same colour as the upper one, and glabrous in adult leaves. Stipules kidney-shaped, or half-heart-shaped. Catkins sessile. Capsule ovate-lanceolate, glabrous or silky, stalked. Stalks three to four times as long as the gland. Style of middling length. Stigmas ovate, bifid. (*Koch.*) Wild in woods, in mountainous, and subalpine places, at the termination of the growth of the spruce fir, in Carpathia, in Sweden, and on the Alps of Croatia. (*Koch.*) Introduced in 1816, and flowering in May.

216. *S.* STARKEA'NA Willd. Starke's *Sallow, or the Marsh Silesian* Willow.

Identification. Willd. Sp. Pl., No. 46.; Smith in Rees's Cyclo., No. 54.; Hayne Abbild., p. 232.; Host's Salix, p. 27.
The Sexes. The female is figured in *Hayne Abbild.*, and both in *Host Sal.*
Engravings. Hayne Abbild., t. 174.; Host Sal., figs. 89. and 90.

Spec. Char., &c. Leaves elliptical, nearly orbicular, smooth, somewhat serrated in the middle, rather glaucous beneath. Catkins appearing after the leaves. Capsules ovate-lanceolate, stalked, and downy. Stipules small, ovate, and toothed. (*Willd.* and *Smith.*) Found in the bogs of Silesia, by the Rev. Mr. Starke. A shrub, growing to the height of 4 ft.; introduced in 1820, and flowering in April and May. Koch regards it as identical with *S.* livida *Wahl.*

217. *S.* TETRA'NDRA *Host.* The four-stamened Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. From the specimen in the Hackney arboretum, this kind appears closely allied to *S.* frágilis.

218. *S.* THYMELÆOI'DES *Host.* The Wild-Olive-like Willow.

Identification. Lodd. Cat., ed. 1826.

Description, &c. There are living specimens of this kind of willow in the Hackney and Goldworth arboretums. Those in the former are dwarf plants, appearing to belong to the group Cinèreæ.

219. *S.* TREVIRA'NA Lk. Treviranus's Willow.

Identification. Link Enum.; Sweet's Hort. Brit., No. 19.; ? Spreng. Syst., incidentally in Koch's Comm.

Description, &c. Koch mentions the *S.* Trevirànì of Spreng. in the list at the end of his work, as one of the kinds which he had not observed with sufficient accuracy to describe; and states that it was in the Erlangen Botanic Garden in 1828, but that it had not then flowered. (*Comm.*, p. 64.)

220. *S.* VELUTI'NA *Willd.* The velvet Willow.

Identification. Willd. Enum.; Sweet's Hort. Brit., No. 216.

221. *S.* VERSIFO'LIA *Spreng.* The twining-leaved Willow.

Identification. Spreng. Syst.; Sweet's Hort. Brit., No. 117.; Lodd. Cat., ed. 1836.

Description, &c. From the specimen at Messrs. Loddiges, this is a dwarf sallow belonging to the group Cinèreæ.

222. *S.* VACCINIOI'DES *Host.* The Vaccinium-like Willow.

Identification. Lodd. Cat., ed. 1836.

Description, &c. The plant bearing this name in the Hackney arboretum, appears allied to *S.* frágilis.

223. *S.* WALDSTEINIA'NA Willd. Waldstein's Willow.

Identification. Willd., No. 50.; Smith in Rees's Cyclo., No. 61.
Synonyme. *S.* alpéstris *Host Sal. Austr.*, 1. p. 30.
The Sexes. Both are figured in *Host Sal.*
Engravings. Host Sal. t. 99. and t. 100.

Spec. Char., &c. Leaves obovate elliptic, smooth, rather acute, remotely serrated in the middle only; shining above, somewhat glaucous beneath. Germen lanceolate, silky, and perfectly sessile. Anthers yellow. Young branches smooth. (*Willd.* and *Smith.*) Found on the Croatian Alps. Very nearly akin to *S.* Dicksoniàna, but differing in the smoothness of its branches. A shrub, about 4 ft. high. Introduced in 1822, and flowering from April to June.

224. *S.* WULFENIA'NA Willd. Wulfen's Willow.

Identification. Willd. Sp. Pl., 4. p. 660.; Smith in Rees's Cyclo., No. 16.; Host Sal. Austr., 1. p. 29.
Synonymes. *S.* hastàta var. *Koch Comm.*, p. 43.; ? *S.* phylicæfòlia *Wulf.* in *Jacq. Coll.*, 2. p. 139.; *Host Syn.*, 526.
The Sexes. Both are figured in *Host Sal.*
Engravings. Sal. Austr., t. 95., and t. 96.

Spec. Char., &c. Leaves obovate, bluntish, serrated, smooth, glaucous beneath. Catkins dense with fringed scales. Germen stalked, awl-shaped, nearly smooth. Style longer than the stigmas. (*Smith* in *Rees's Cyclo.*) This is not the *S.* Wulfeniàna of Smith in *Eng. Fl.*, described p. 1582. Mr. Borrer says of this species, "The true *S.* Wulfeniàna of Willdenow we have no reason to believe a British species. We have seen of it several foreign specimens of both sexes; in all of

which, and especially in those from the younger Jacquin preserved in the Smithian collection, the bracteal leaves are large and closely resemble those of the leafy twigs; and the scales of the catkin are naked, except a marginal fringe." (*Borrer* in *Eng. Bot. Suppl.*, t. 2656.) The *S. Wulfeniàna* of Willdenow appears to be a native of Carinthia, where it was found by Wulfen. It flowers from May to July, and was introduced in 1818.

App. i. *Kinds of Sàlix described or recorded in Botanical Works, but not introduced into Britain, or not known by these Names in British Gardens.*

S. *árctica* R. Br., in his *List of the Plants collected in Ross's Voyage*. Koch, in his *Comm.*, p. 61., note *, considers this species about intermediate between S. Jacquiniì Host and S. reticulàta *L.*; and he has described it. He states it to be a native of the most northern part of America, Hudson's Bay, Melville Island, &c. It is also described by Dr. Richardson, in *App. to Franklin's First Journey*, p. 752, 753. According to Dr. Lindley (*Nat. Syst. of Bot.*), it is the most northern woody plant that is known. Mr. Borrer considers it to be near *S.* cordifòlia *Pursh*.

S. *desertòrum* Rich. and S. *rostràta* Rich. are mentioned by Dr. Richardson, in *App. to Franklin's First Journey*, as new species.

S. *cineráscens* Link MSS. (Willd. Sp. Pl., 4. p. 706.; Smith in Rees's Cyclo., No. 132.), the ash-coloured Portuguese willow, has the leaves oblong-obovate, pointed, and serrated; hoary with down beneath. Stipules large, lunate, and toothed. (*Willd.* and *Smith.*) A native of marshes in Portugal. This kind is supposed by Koch to be probably identical, or nearly so, with the *S.* grandifòlia of Seringe; and it appears to belong to the group Cinèreæ.

S. *grandifòlia* Seringe Sal. Helv., p. 20.; Koch Comm., p. 36.; *S.* stipulàris *Ser. Sal. exsicc.*; *S.* cineráscens *Willd. Sp. Pl.*, 4. p. 706. This kind is supposed by Koch to be the same as *S.* cineráscens; and it appears to resemble *S.* càprea.

S. *divaricàta* Pall. Fl. Ross., 2. p. 80., Willd. Sp. Pl., 4. p. 675., Smith in Rees's Cyclo., No. 52. This species is a native of the alps of Daûria, where it grows among granite rocks, over which it spreads in a prostrate form. The stem is about as thick as the finger, very much divided, and forked from its origin, with short, rigid, depressed, yellowish brown branches. The leaves are crowded about the ends of the shoots; in some specimens lanceolate, and nearly entire; in others obovate-lanceolate, coarsely serrated, the serratures somewhat wavy and obtuse: both sides are quite smooth. Pallas states that this kind resembles the *S. phylicifòlia* of Linnæus. (*Smith.*)

S. *hirsùta* Thunb. Prod., 6., Fl. Cap., 1. p. 141.; Willd. Sp. Pl., No. 695., Smith in Rees's Cyclo., No. 106. A tree 6 ft. high, a native of the Cape of Good Hope; with the leaves on the extreme shoots scarcely 1 in. long, and on very short footstalks, obovate, obtuse, with a point, and clothed on both sides with white hairs. (*Thunb.* and *Smith.*)

? S. *pedicellàta* Desf. Atlant., 2. p. 362., Willd. Sp. Pl., 4. p. 706., Smith in Rees's Cyclo., No. 133. The stalked Barbary Sallow. Leaves lanceolate, rugose, downy beneath. Capsules stalked, and glabrous. Nearly allied to *S.* càprea, but differing in the smoothness of the capsule. (*Smith*, adapted.)

S. *íntegra* Thunb. Fl. Jap., 24., Willd. Sp. Pl., 4. p. 686., Smith in Rees's Cyclo., No. 81. The entire-leaved Japan Willow. Leaves entire, smooth, linear oblong, obtuse. Gathered by Thunberg in Japan. (*Smith.*)

S. *japónica* Thunb. Fl. Jap., 24.; Willd. Sp. Pl., 4. p. 668., Smith in Rees's Cyclo., No. 34.; Rju, vulgo Aujaki, *Kæmpfer Amœn. Exot.*, 908. Leaves serrated, glabrous, lanceolate, glaucous beneath. Twigs pendulous. A middle-sized tree; a native of Japan.

S. *mucronàta* Thunb. Prod., 6., Fl. Cap., 1. 140.; Willd. Sp. Pl., 4. p. 685.; Smith in Rees's Cyclo., No. 74. Leaves entire, smooth, oblong, pointed, and about 1 in. in length. Gathered, at the Cape of Good Hope, by Thunberg. (*Smith.*)

S. *rhamnifòlia* Pall. Fl. Ross., 2. p. 84., Willd. Sp. Pl., 4. p. 53., Smith in Rees's Cyclo., No. 53.; *S.* pùmila, fòliis ovàlibus, &c., *Gmel. Sib.*, 1. t. 35. f. A. A procumbent shrub, a native of mountain bogs, and the stony banks of rivers, in Siberia. Leaves firm and rigid; about 1½ in. long, and mostly tapering at the base. (*Smith.*)

S. *Seringeàna* *Gaudin* in *Seringe's Sal. Helv.*, p. 37., *Koch Comm.*, p. 33.; *S.* lanceolàta *Ser. Sal. exsicc.*, No. 70.; *S.* Kanderiàna Ser. Sal exsicc., No. 42.; *S.* longifòlia *Schleich. Cat.*

Spec. Char., &c. Leaves oblong-lanceolate, acuminate, crenulate; white on the under surface with white tomentum, and rugose with veins. Stipules ovate, acute. Catkins arched, sessile, slender, bracteated at the base with small leaves. Capsule ovate-lanceolate, tomentose, stalked; the stalk twice as long as the gland. Style elongated. Stigmas bifid. (*Koch.*) It grows wild by rivulets, in subalpine valleys of Switzerland and Tyrol. (*Id.*)

S. *seròtina* Pall. Fl. Ross., 1. p. 2. 77., Itin., 3. 759. t. N. n., Smith in Rees's Cyclo., No. 83., and incidentally in Eng. Flora, 4. p. 228.; *S.* No. 19. *Gmel. Sib.*, I. 163.; *S.* càprea γ *Lin. Sp. Pl.*, 1448.; *S.* ægyptiaca *Willd.*, so far as relates to the synonyme of Pallas; *S.* Gmeliniàna Willd. Sp. Pl., 4. p. 709.

Spec. Char., &c. Leaves elliptic-lanceolate, entire, often more than a span long; rather downy on the upper surface, silky on the under one, revolute in the bud. Stipules lanceolate. Catkins sessile, unattended by leaves, very hairy. Ovaries lanceolate, silky, stalked. (*Smith.*) Abundant in the sandy islands and shallows in the southern parts of the Wolga; not expanding its catkins or leaves till the beginning of June. In dry ground, it becomes a tree; but is otherwise shrubby, 6 ft. high; with brittle grey or yellowish twigs, glabrous, except when very young. It is distinguished from *S.* càprea, by its broad and serrated leaves, and ovate ovaries. (*Id.*)

To the names above given many others might be added, and in particular the greater number of those described in Host's *Flora Austriaca*, which we have preferred giving in a separate Appendix. See App. iv.

The plates, which form pages 1603. *to* 1630., contain figures of leaves, of the natural size, from the engravings of willows given in the *Salictum Woburnense;* and against each leaf, or pair of leaves, we have placed the same number, and the same name, which are given in the *Salictum*. In App. ii., in p. 1631., will be found an alphabetical list of all these names, with references to the figures of leaves in our pages; and the same figures are also referred to, where the respective kinds are described, in the description of willows in British collections, contained in the pages between p. 1490. and p. 1595.

§ i. *Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.



§ i. continued.—*Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.



§ i. continued.—*Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.



15. *S.* triándra.

12. *S.* virgàta.

13. *S.* undulàta.

15

14. *S.* lanceolàta.

§ i. continued.—*Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.

21. *S.* annulàris.



20. *S.* vitellìna.



18. *S. amygdálina.*





16. *S.* Hoffmann*iána.*



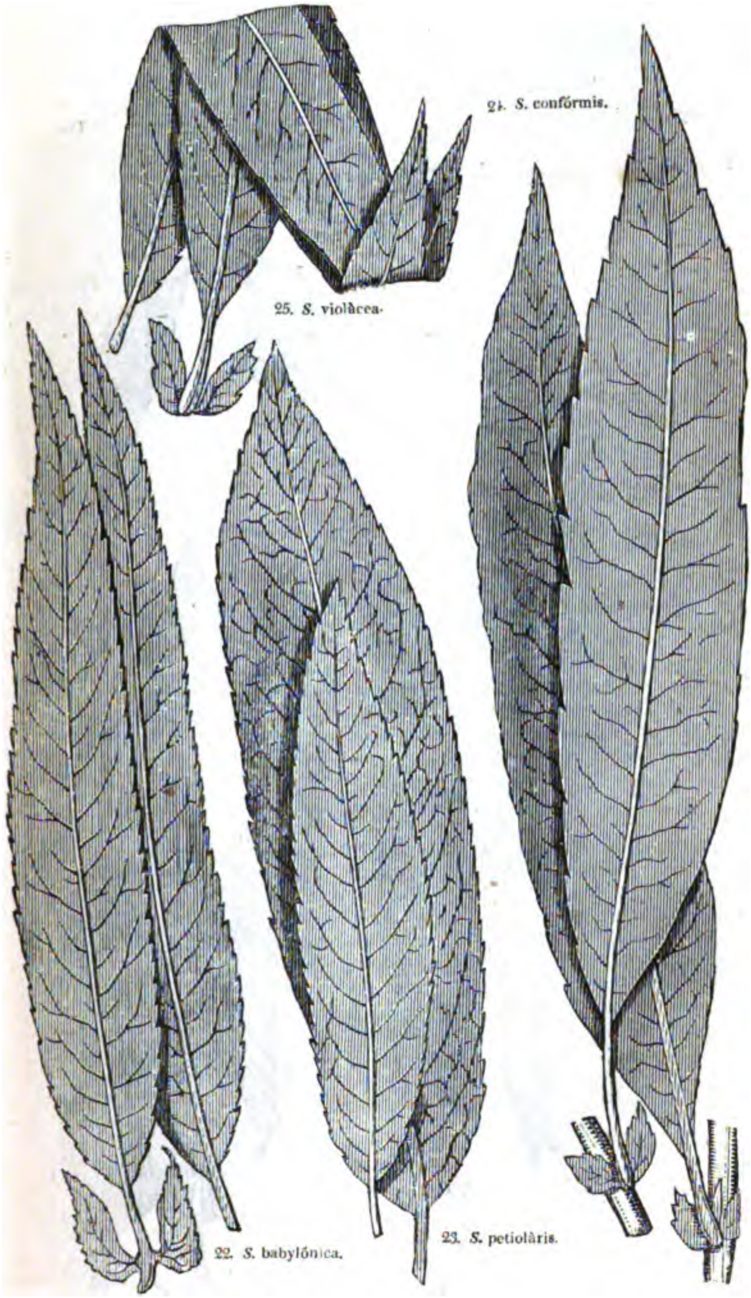
17. S. Villars*iána.*



19. S. montàna.

§ i. continued.—*Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.



§ i. continued.—*Adult Leaves serrated, nearly smooth.*

OSIERS AND WILLOWS.



28. *S.* Russelliana.

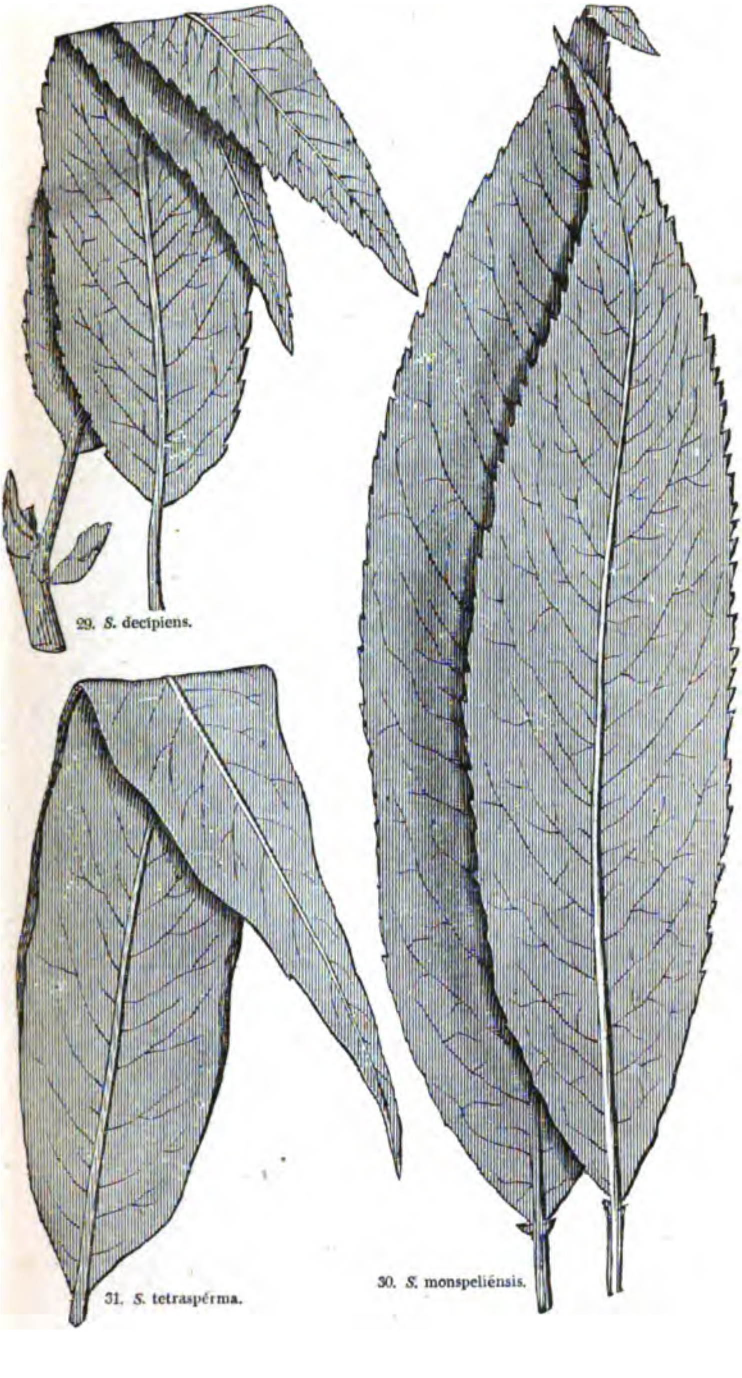
27.

26. *S.* præ'cox.

27. *S.* frágilis.

§ i. continued. — *Adult Leaves serrated, nearly smooth.*

WILLOWS.



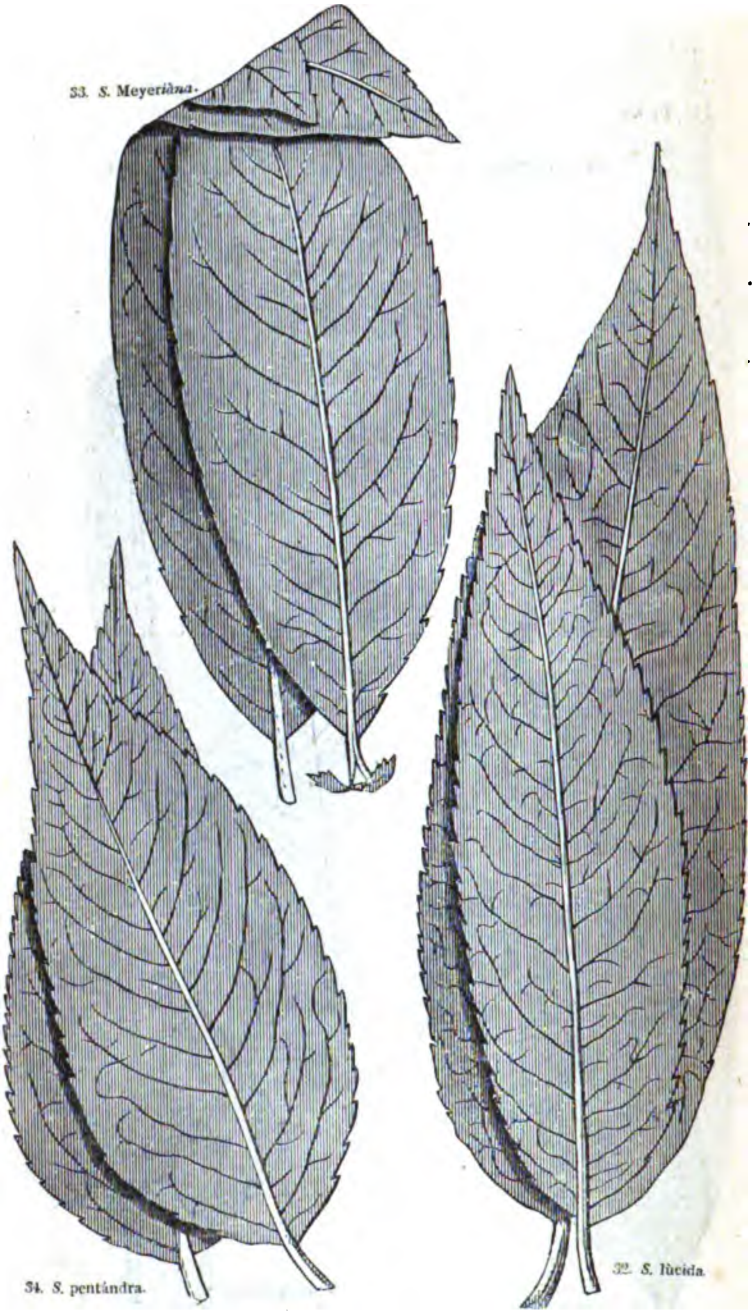
29. *S.* decipiens.

30. *S.* monspeliénsis.

31. *S.* tetraspérma.

§ i. continued. — *Adult Leaves serrated, nearly smooth.*

WILLOWS.

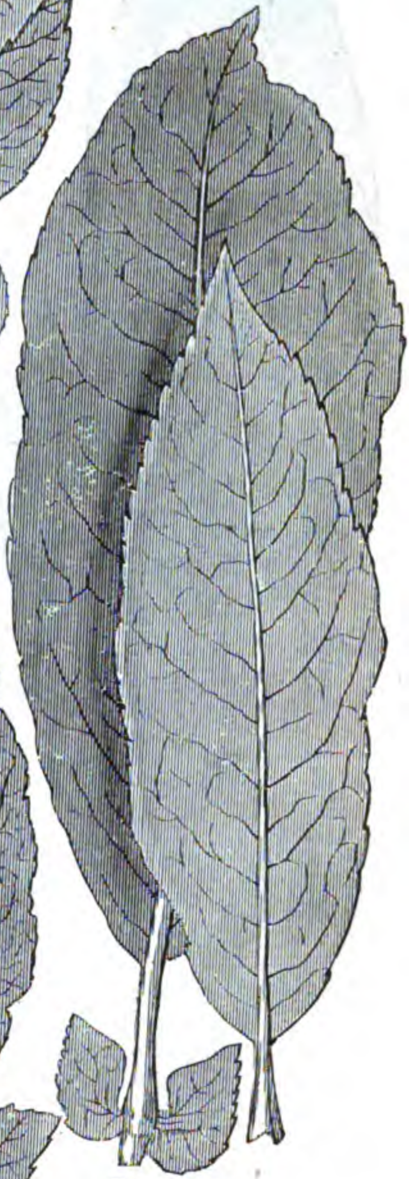


§ i. continued.—*Adult Leaves serrated, nearly smooth.*

WILLOWS.



36. S. malifòlia.



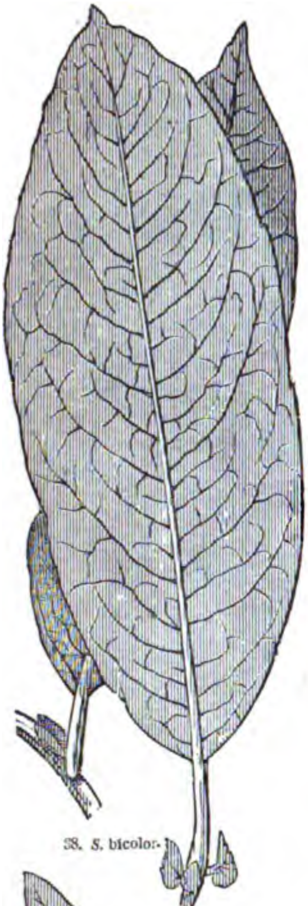
37. S. nigricans.



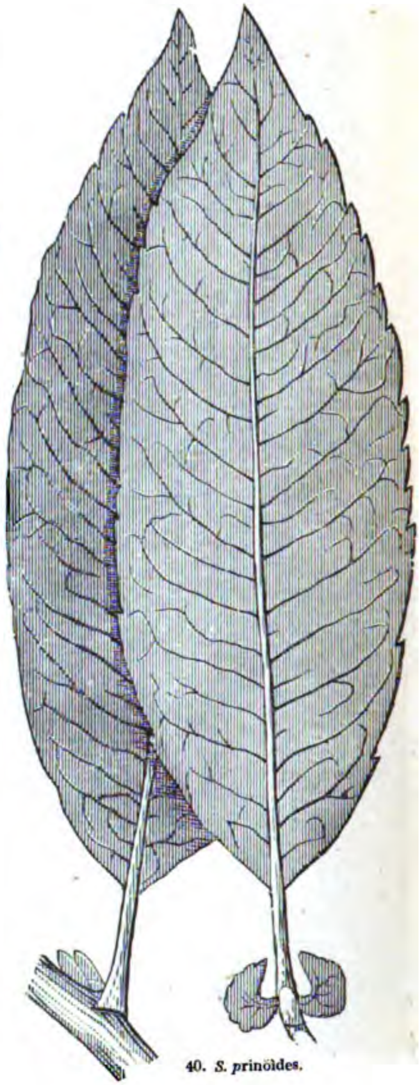
35. S. hastàta.

§ i. continued.—*Adult Leaves serrated, nearly smooth.*

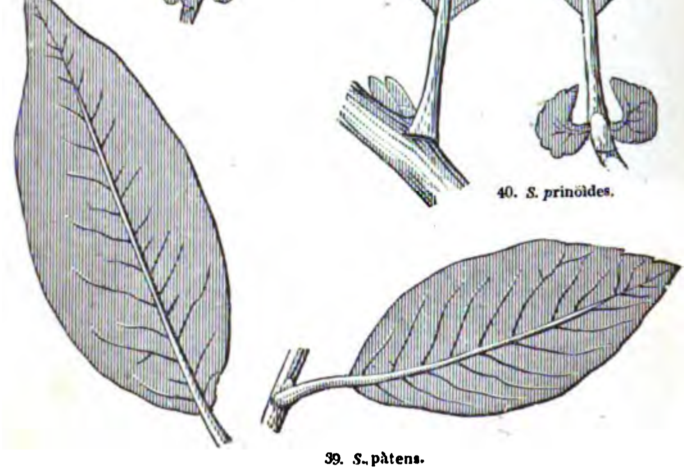
WILLOWS.



38. *S.* bicolor.



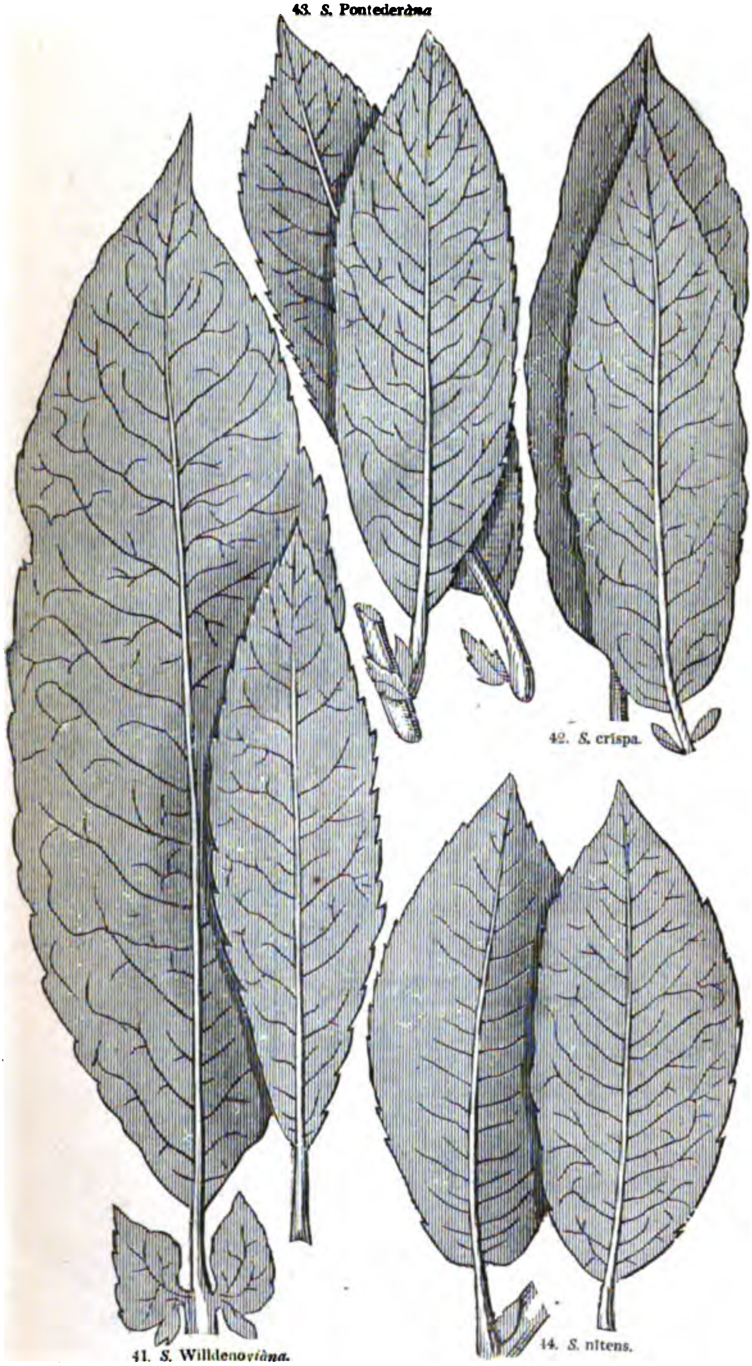
40. *S.* prinoides.



39. *S.* pàtens.

§ i. continued.—*Adult Leaves serrated, nearly smooth.*

WILLOWS.



§ i. continued. — *Adult Leaves serrated, nearly smooth.*

WILLOWS.

50. *S.* tenuifòlia.





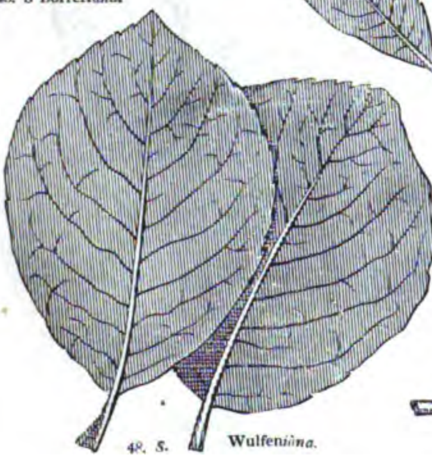
46. *S.* phylicifòlia.



45. *S* Borreri*ána.*



47. *S.* Davalli*àna.*



48. *S.* Wulfeni*àna.*

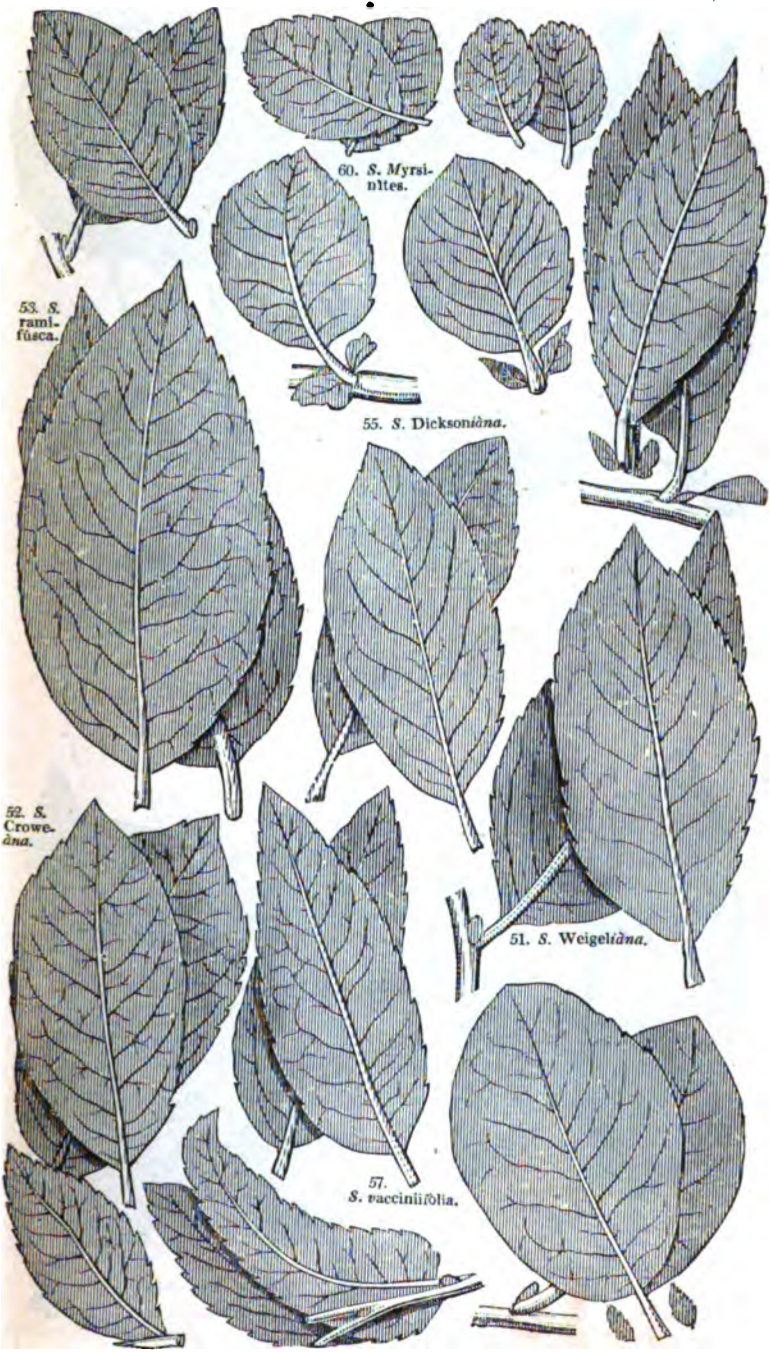


49. *S.* tétrapla.

§ i. continued.— *Adult Leaves serrated, nearly smooth.*

WILLOWS.

56. *S.* prunifòlia. 63. *S.* polàris. 62. *S.* herbàcea. 54. *S.* floribúnda.



58. *S.* venulòsa. 59. *S.* carinàta. 61. *S.* procúmbens.

§ ii. *Adult Leaves entire, nearly smooth.*

WILLOWS.



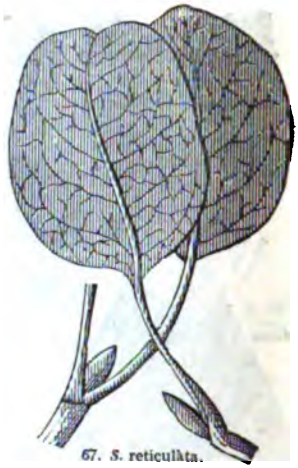
65. *S. serpyllifolia.*



66. *S. myrtilloïdes.*



64. *S. Kitaibeliàna.*

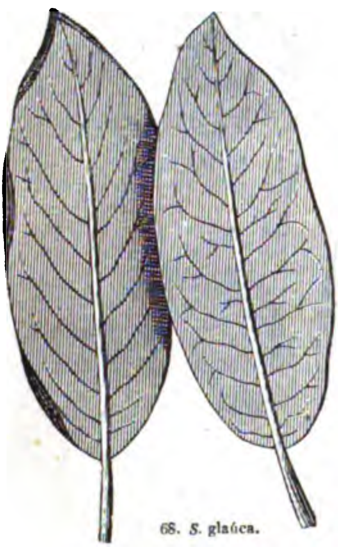


67. *S. reticulàta.*

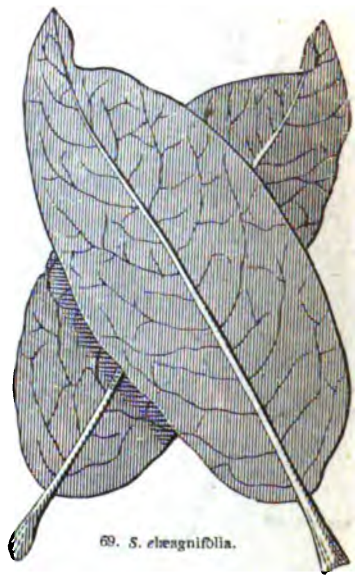
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§ iii. *Leaves all shaggy, woolly, or silky.*

WILLOWS.



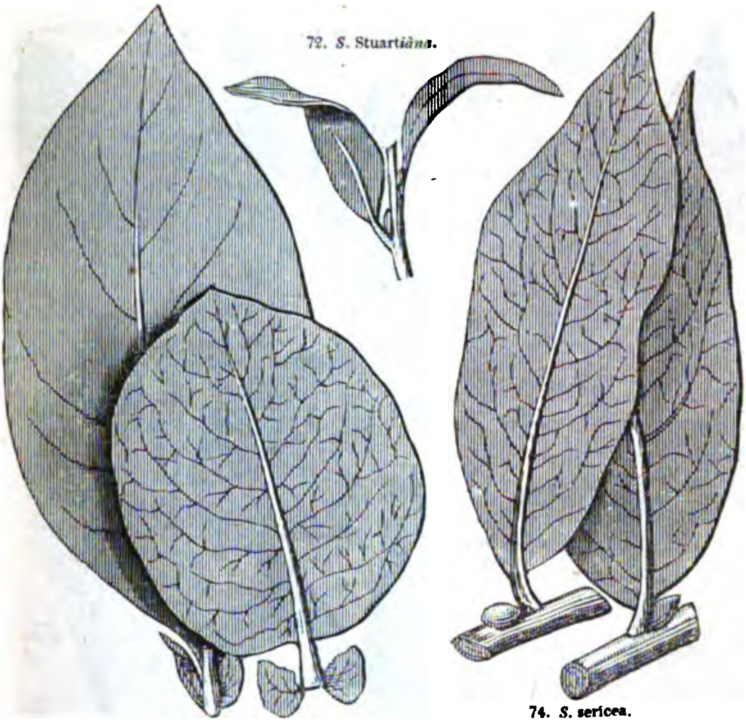
68. *S. glaùca.*



69. *S. elæagnifòlia.*

§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

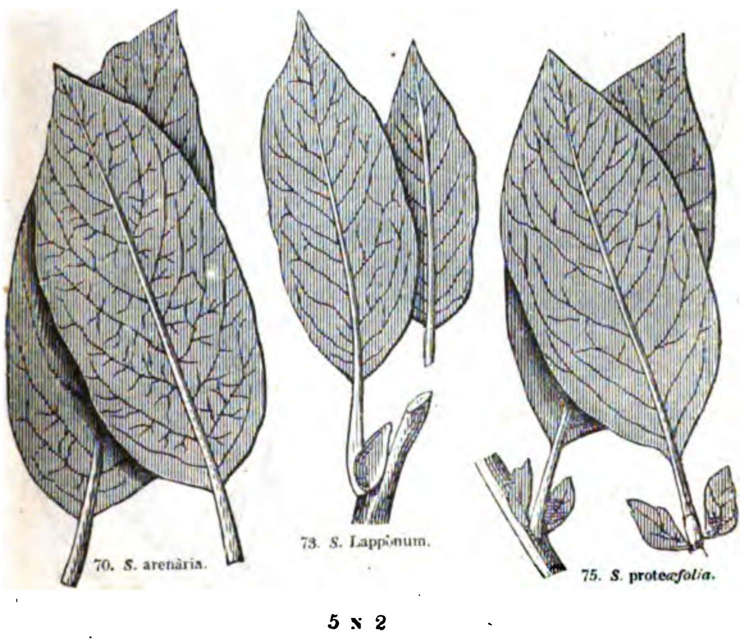
WILLOWS.



72. *S.* Stuartiàna.

71. *S.* lanàta.

74. *S.* sericea.



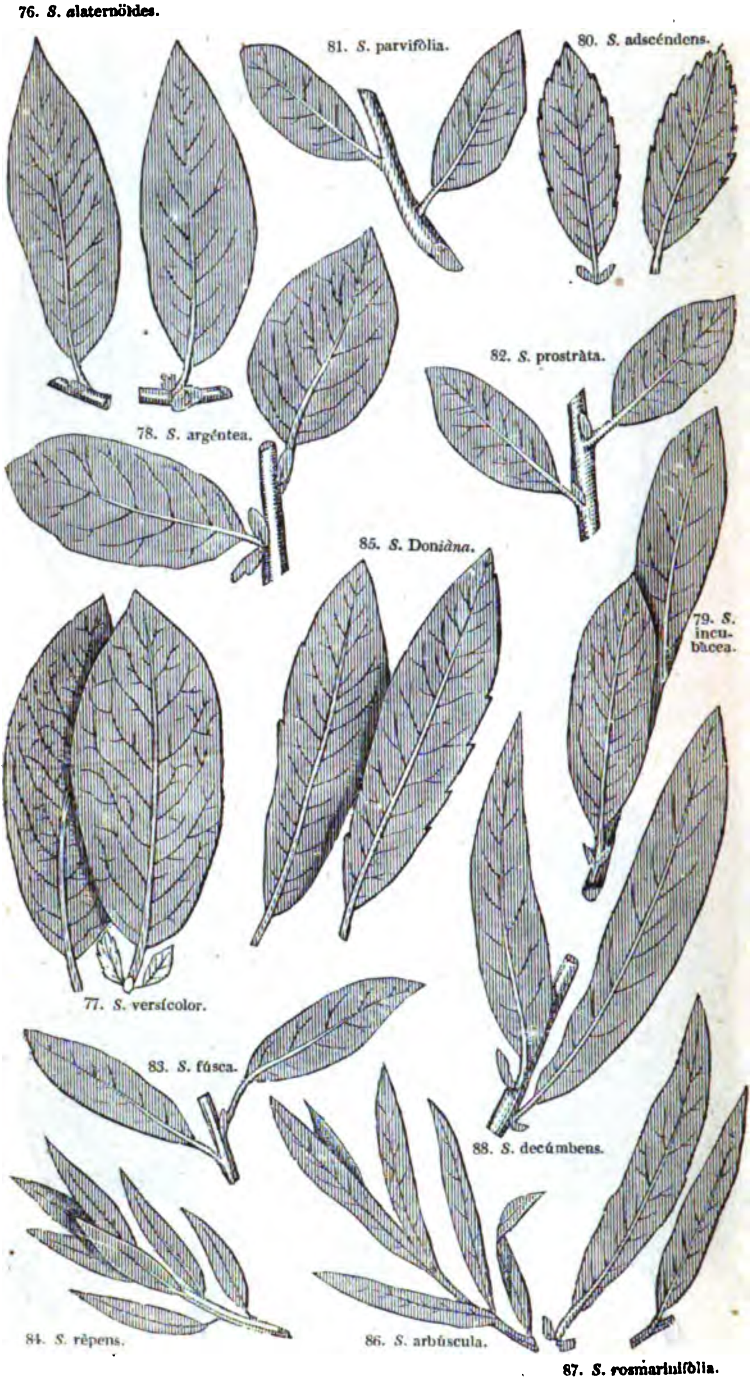
70. *S.* arenària.

73. *S.* Lappònum.

75. *S.* proteæfolia.

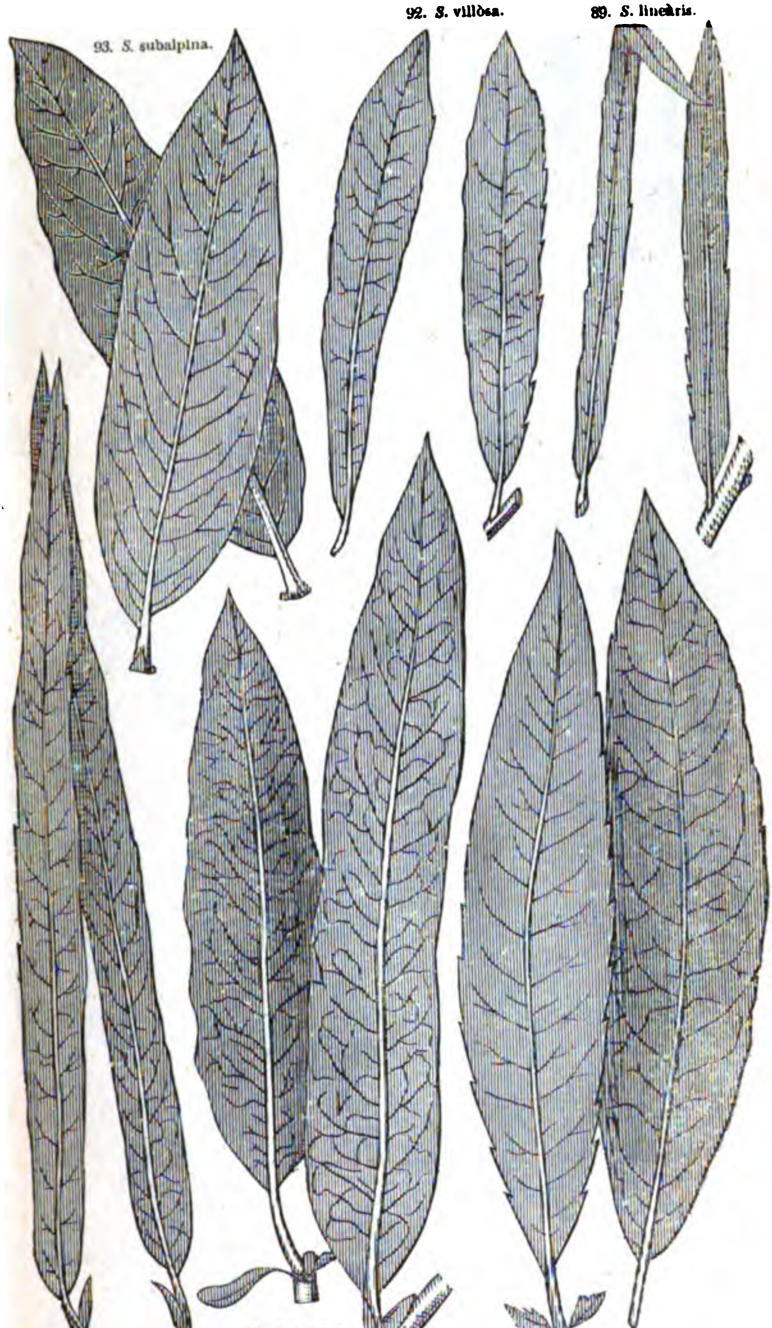
§ iii. continued. — *Leaves all shaggy, woolly, or silky.*

WILLOWS.



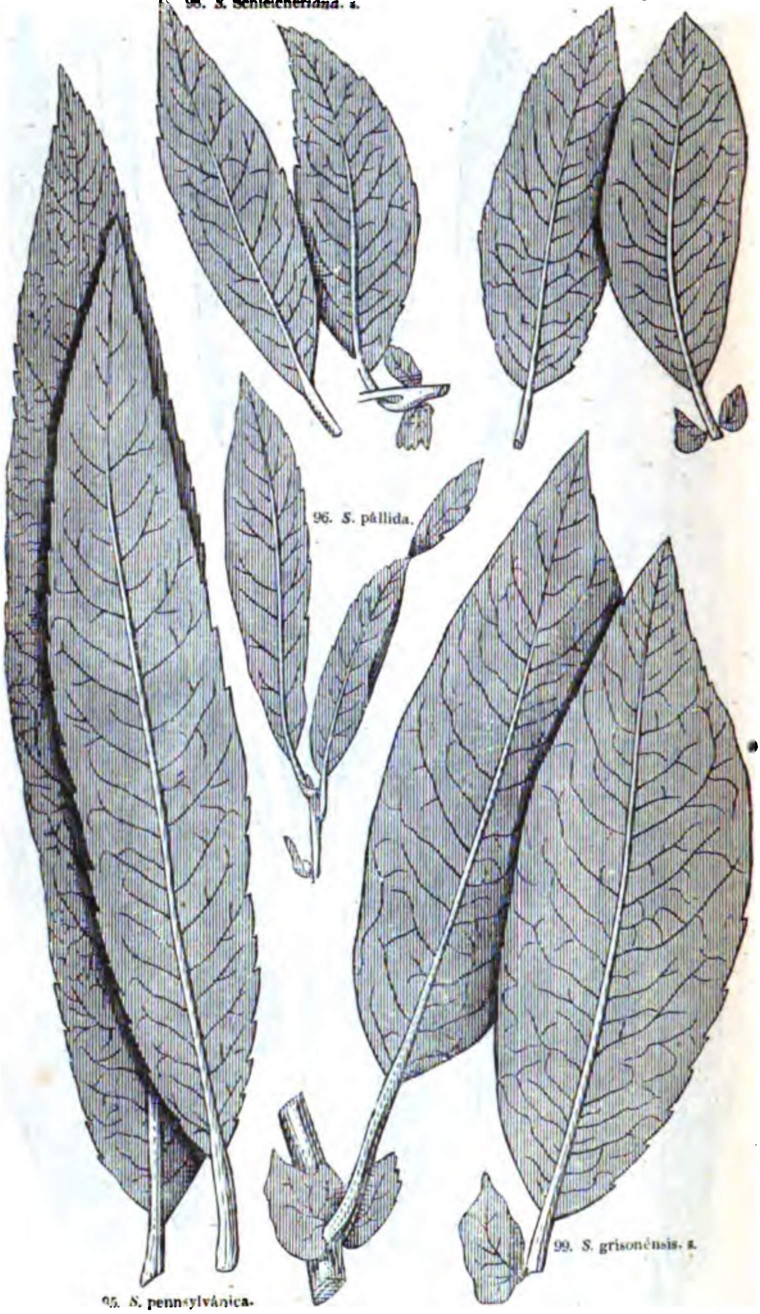
§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

WILLOWS.



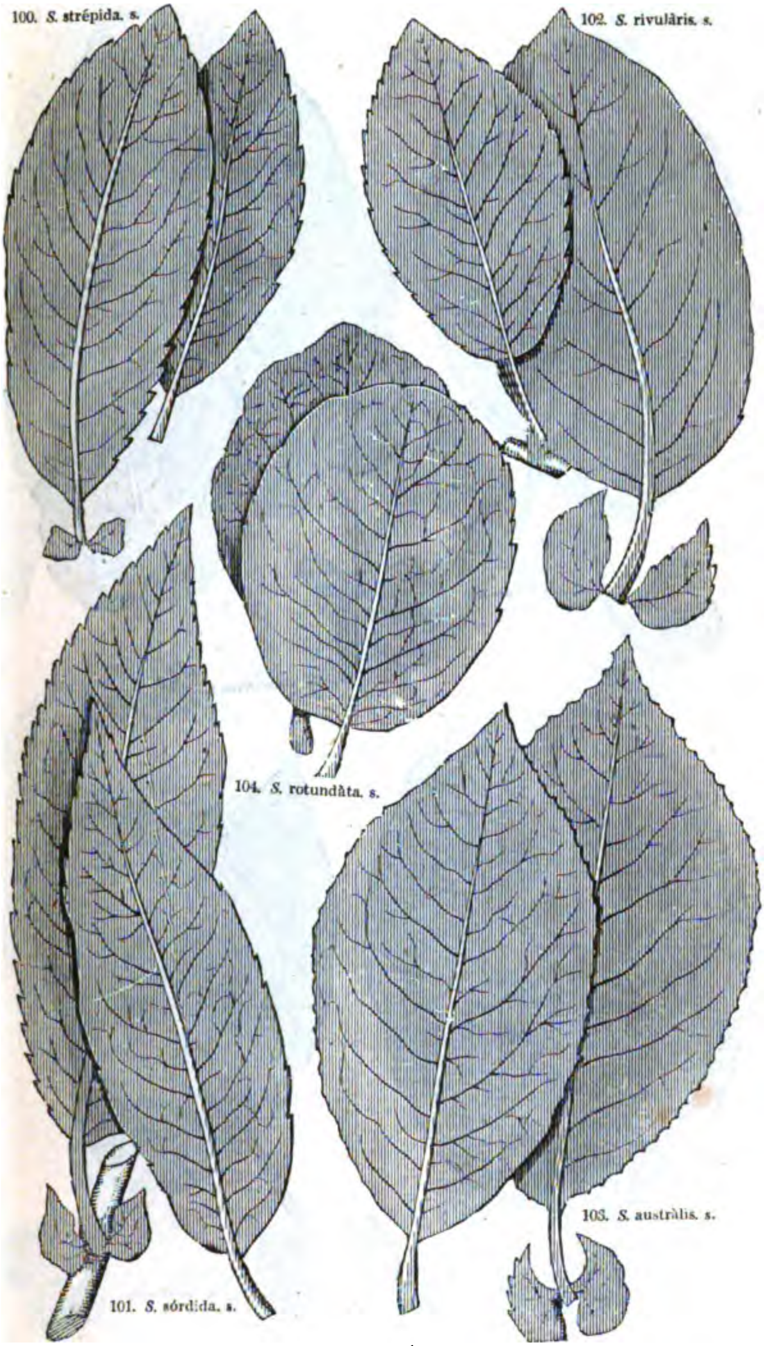
§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

WILLOWS AND SALLOWS.


98. S. Schleicheriana. s.
97. S. petræa. s.
96. S. pállida.
99. S. grisonénsis. s.
95. S. pennsylvánica.

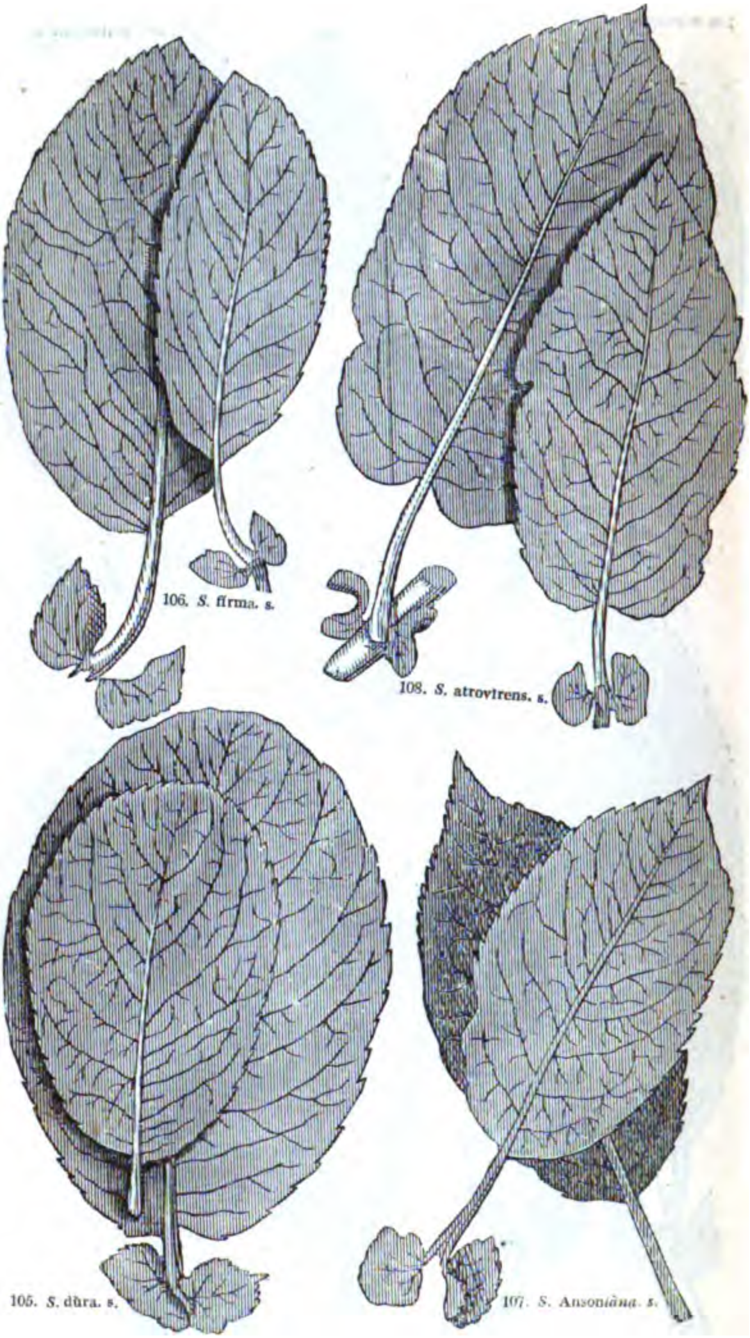
§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

SALLOWS.



§ iii. continued. — *Leaves all shaggy, woolly, or silky.*

SALLOWS.



106. *S. firma.* s.

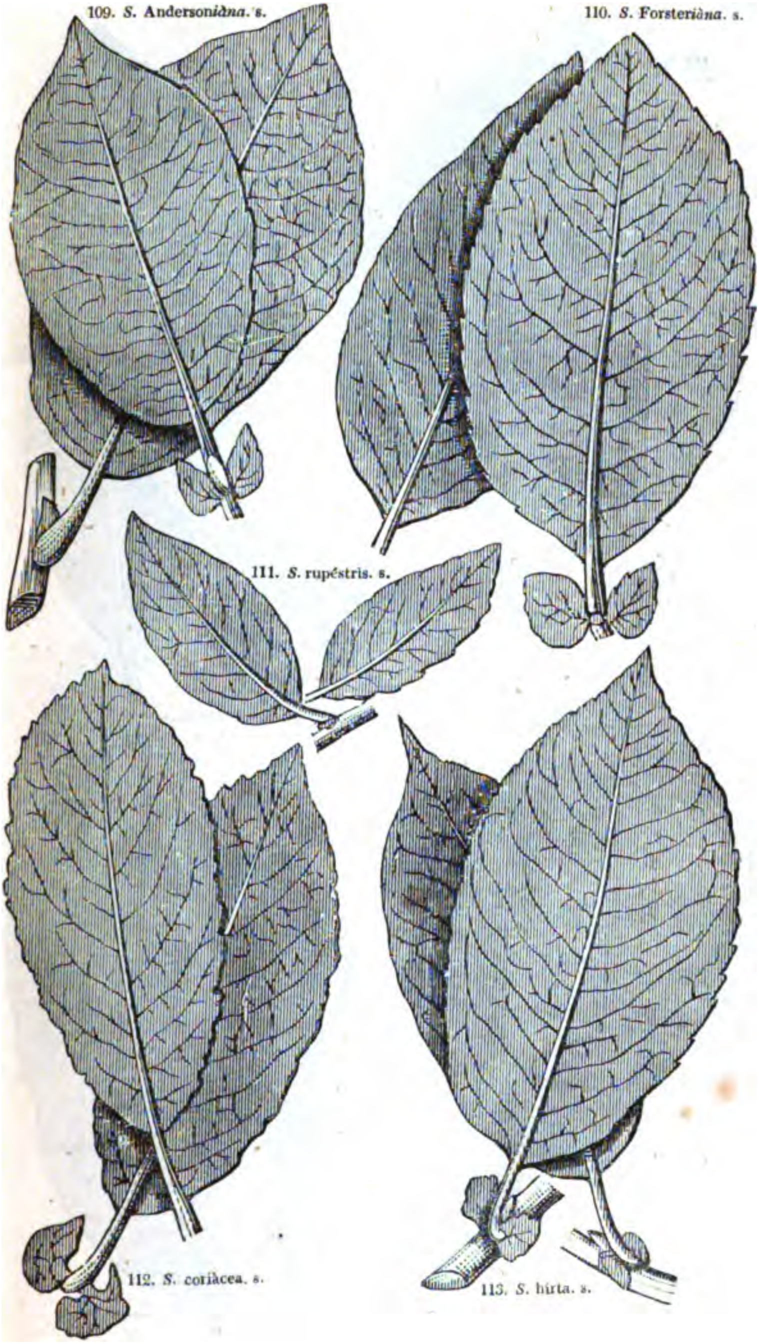
108. *S. atrovirens.* s.

105. *S. dùra.* s.

107. *S. Ansoniàna.* s.

§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

SALLOWS.



109. *S.* Andersoniàna. s.

110. *S.* Forsteriàna. s.

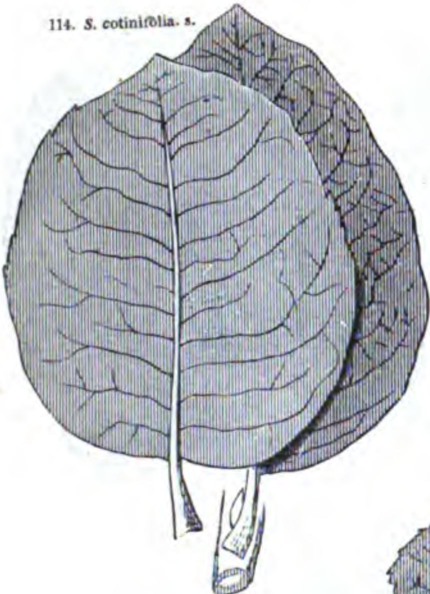
111. *S.* rupéstris. s.

112. *S.* coriàcea. s.

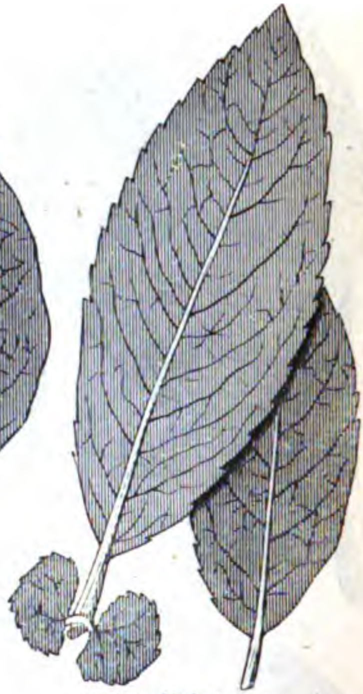
113. *S.* hírta. s.

§ iii. continued. — *Leaves all shaggy, woolly, or silky.*

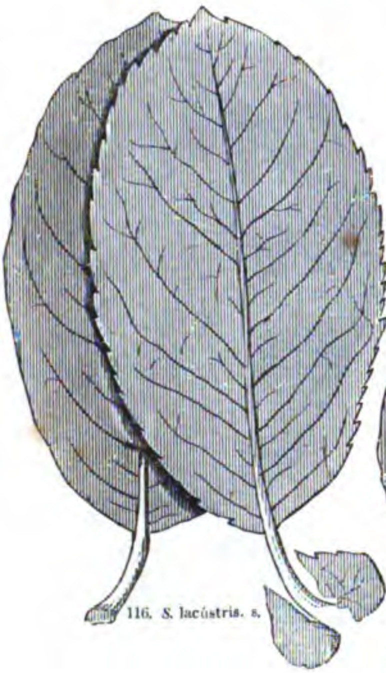
SALLOWS.



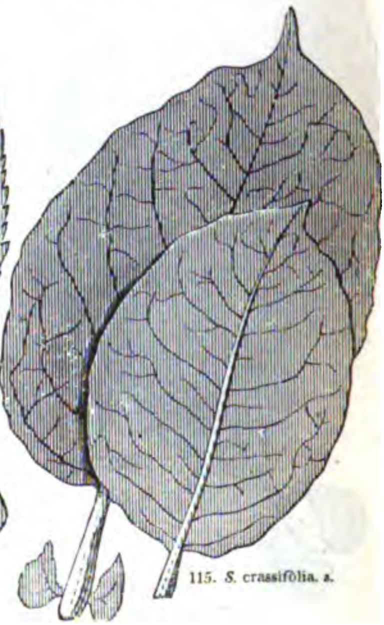
114. *S.* cotinifòlia. *s.*



117. *S.* vaudénsis. *s*



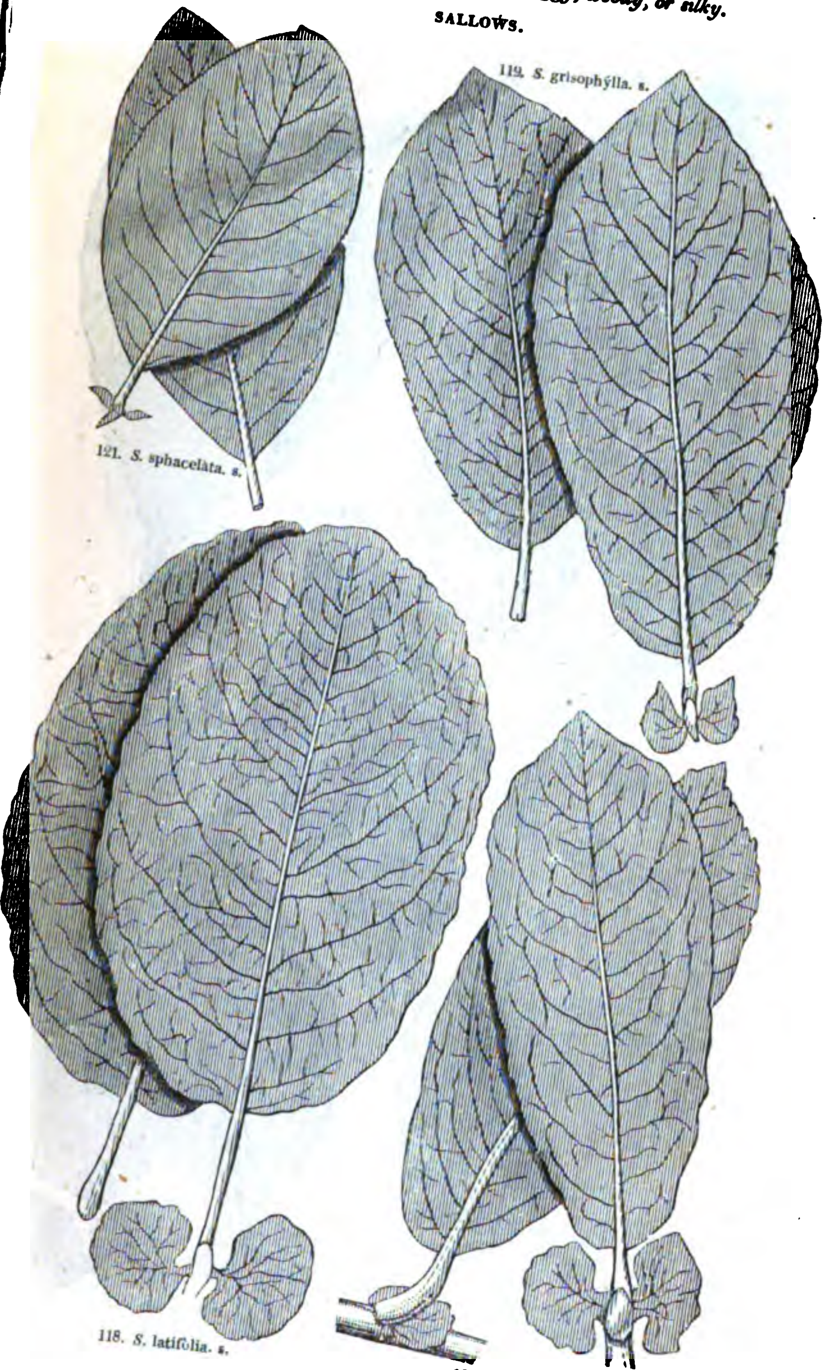
116. *S.* lacústris. *s.*



115. *S.* crassifòlia. *s.*

§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

SALLOWS.



119. *S. grisophýlla.* s.

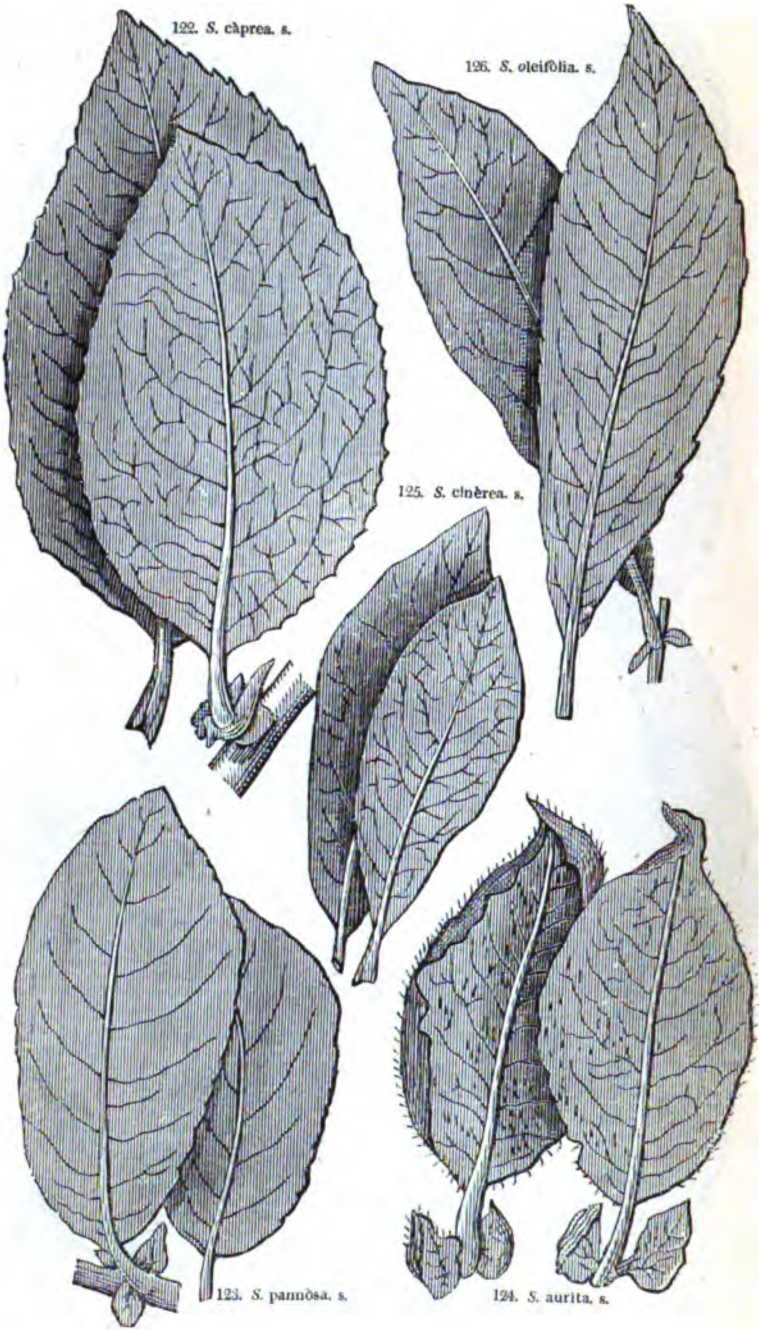
121. *S. sphacelàta.* s.

118. *S. latifòlia.* s.

120. *S. incanéscens.* s.

§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

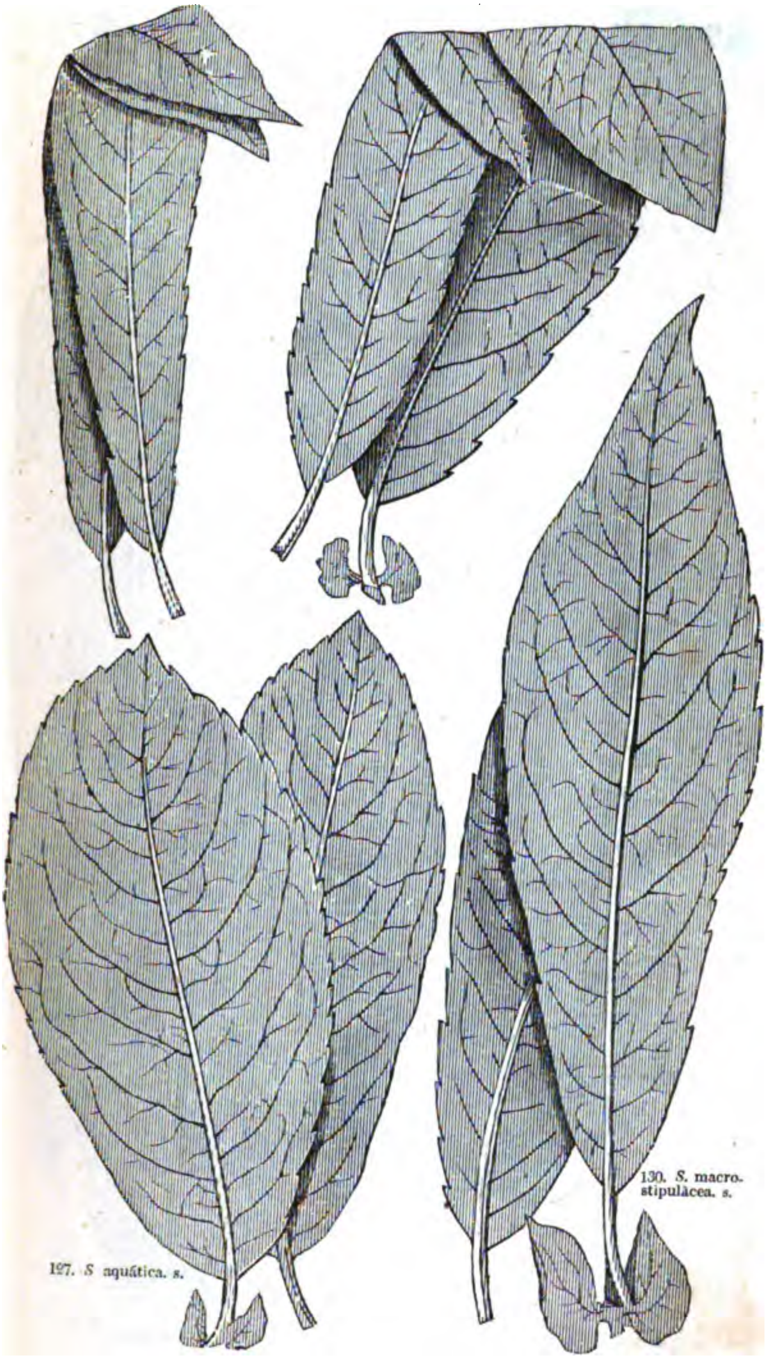
SALLOWS.



122. *S. càprea.* s.
126. *S. oleifòlia.* s.
125. *S. cinèrea.* s.
123. *S. pannòsa.* s.
124. *S. aurita.* s.

§ iii. continued. — *Leaves all shaggy, woolly, or silky.*

SALLOWS.



128. *S.* ferruginea. s.

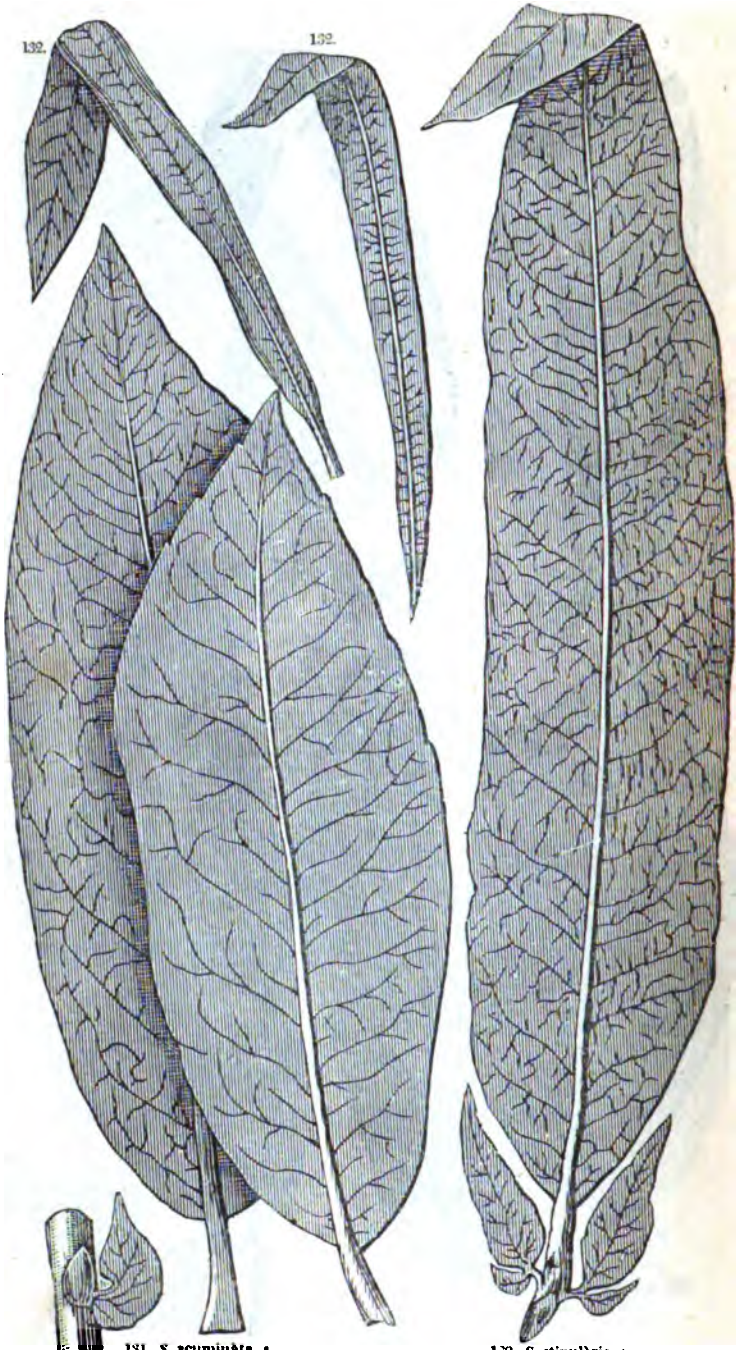
129. *S.* geminàta.

130. *S.* macro-stipulàcea. s.

127. *S* aquàtica. s.

§ iii. continued. — *Leaves all shaggy, woolly, or silky.*

SALLOW AND OSIER.



131. *S.* acuminàta. s

132. *S.* stipulària. s

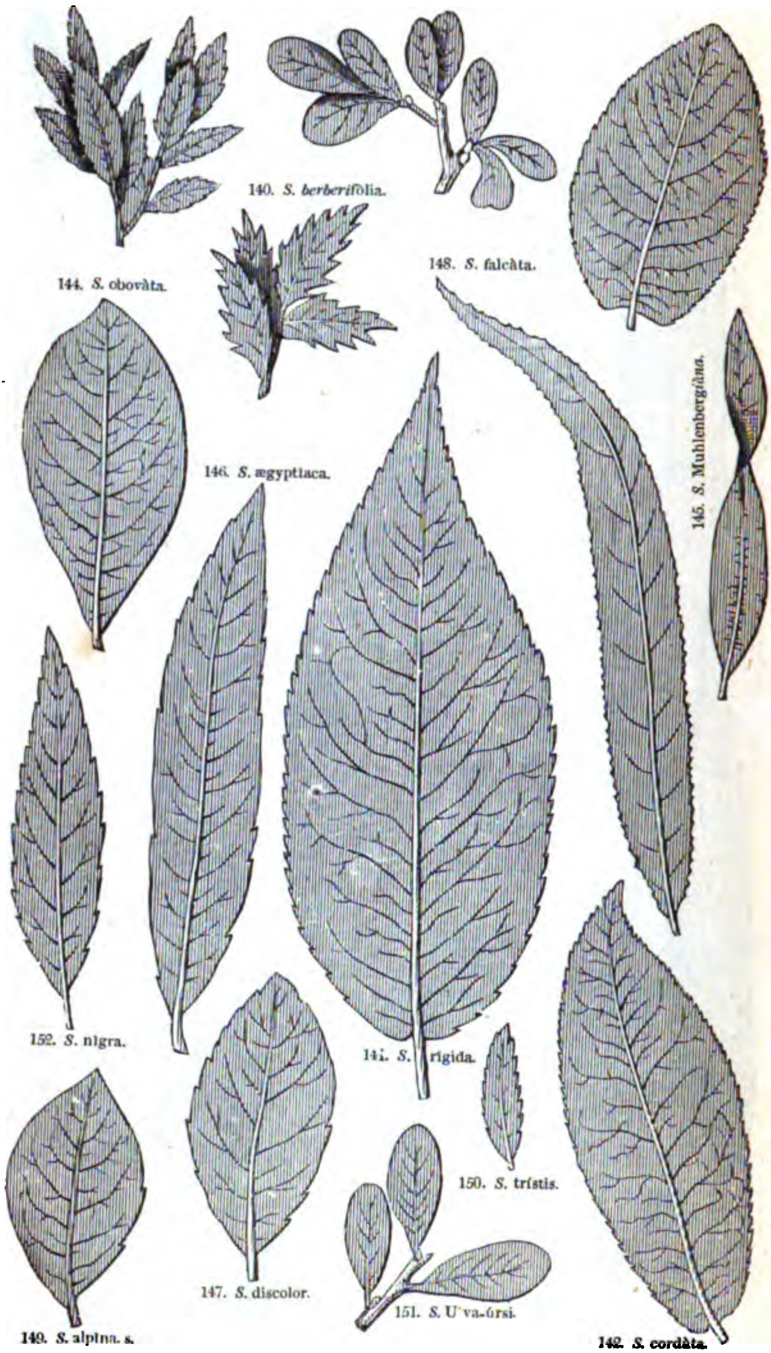
§ iii. continued.—*Leaves all shaggy, woolly, or silky.*

OSIERS AND WILLOWS.



§ iv. *Miscellaneous Kinds.*

WILLOWS, OSIERS, AND SALLOWS.



App. ii. *Kinds of* Sàlix *figured or described in the* Salictum Woburnense.

The preceding Twenty-eight Plates, forming pages 1603. to 1630., contain specimens of the leaves of most of the kinds in the Woburn Collection, of the natural size; and references to these figures, and also to the pages in this work containing the descriptions, synonymes, &c., of the Woburn species, are here given. The names are arranged alphabetically for the convenience of reference; but, in the *Salictum Woburnense*, they are arranged in the order in which the leaves are given in the Twenty-eight pages of Plates.

Sàlix acuminàta, f. 131. in p. 1628., and our No. 82. in p. 1553.
adscéndens, f. 80. in p. 1618., and our No. 52. var. 4. in p. 1538.
ægyptiaca, f. 146. in p. 1630., and our No. 165. in p. 1594.
alaternöìdes, f. 76. in p. 1618., and our No. 57. in p. 1542.
álba, f. 136. in p. 1629., and our No. 26. in p. 1522.
alpìna, f. 149. in p. 1630., and our No. 166. in p. 1594.
ambígua, No. 154. in *Sal. Wob.*, and our No. 25. (Purshiàna) in p. 1521.
amygdálina, f. 18. in p. 1606., and our No. 14. in p. 1500.
Andersoniàna, f. 109. in p. 1623., and our No. 110. in p. 1568.
annulàris, f. 21. in p. 1606., and our No. 19. var. 3. (babylónica críspa) in p. 1514.
Ansoniàna, f. 107. in p. 1622., and our No. 112. in p. 1569.
aquática, f. 127. in p. 1627., and our No. 91. in p. 1559.
arbúscula *Smith*, f. 86. in p. 1618., and our No. 49. (angustifòlia) in p. 1535.
arbúscula *L.*, f. 138. in p. 1630., and our No. 163. var. 4. in p. 1593.
arenària, f. 70. in p. 1617., and our No. 65. in p. 1545.
argéntea, f. 78. in p. 1618., and our No. 52. var. 6. in p. 1539.
atropurpùrea, No. 156. in *Sal. Wob.*, and our No. 107. in p. 1567.
atrovìrens, f. 108. in p. 1622., and our No. 124. in p. 1575.
aurìta, f. 124. in p. 1626., and our No. 95. in p. 1560.
austràlis, f. 103. in p. 1621., and our No. 99. in p. 1565.
babylónica, f. 22. in p. 1607., and our No. 19. in p. 1507.
berberifòlia, f. 140. in p. 1630., and our No. 167. in p. 1595.
bícolor, f. 38. in p. 1612., and our No. 131. (laúrina) in p. 1578.
Bonplandiàna, f. 9. in p. 1604., and our No. 30. in p. 1529.
Borreriàna, f. 45. in p. 1614., and our No. 134. in p. 1579.
cándida, f. 91. in p. 1619., and our No. 72. in p. 1548.
càprea, f. 122. in p. 1626., and our No. 97. in p. 1561.
carinàta, f. 59. in p. 1615., and our No. 146. in p. 1585.
carpinifòlia, No. 155. in *Sal. Wob.*, and our No. 115. in p. 1570.
cinèrea, f. 125. in p. 1626., and our No. 90. in p. 1558.
cærùlea, f. 137. in p. 1629., and our No. 26. var. 2. in p. 1523.
confórmis, f. 24. in p. 1607., and our No. 35. in p. 1531.
cordàta, f. 142. in p. 1630., and our No. 47. in p. 1534.
cordifòlia, f. 143. in p. 1630., and our No. 160. in 1590.
coriàcea, f. 112. in p. 1623., and our No. 108. in p. 1568.
cotinifòlia, f. 114. in p. 1624., and our No. 104. in p. 1566.
crassifòlia, f. 115. in p. 1624., and our No. 103. in p. 1566.
críspa, f. 42. in p. 1613., and our No. 94. in p. 1560.
Croweàna, f. 52. in p. 1615., and our No. 141. in p. 1583.
damascèna, No. 157. in *Sal. Wob.*, and our No. 111. in p. 1569.
Davalliàna, f. 47. in p. 1614., and our No. 135. in p. 1580.
decípiens, f. 29. in p. 1609., and our No. 20. in p. 1515.
decúmbens, f. 88. in p. 1618., and our No. 50. in p. 1536.
Dicksoniàna, f. 55. in p. 1615., and our No. 144. in p. 1584.
díscolor, f. 147. in p. 1630., and our No. 33. in p. 1530.
Doniàna, f. 85. in p. 1618., and our No. 53. in p. 1540.
dùra, f. 105. in p. 1622., and our No. 117. in p. 1571.
elæagnifòlia, f. 69. in p. 1616., and our No. 60. (elæagnöìdes) in p. 1543.
falcàta, f. 148. in p. 1630., and our No. 41. in p. 1533.
ferrugínea, f. 128. in p. 1627., and our No. 81. in p. 1552.
fírma, f. 106. in p. 1622., and our No. 114. in p. 1570.
floribúnda, f. 54. in p. 1615., and our No. 142. (bícolor) in p. 1583.
Forbyàna, f. 5. in p. 1603., and our No. 5. in p. 1492.
Forsteriàna, f. 110. in p. 1623., and our No. 118. in p. 1571.
frágilis, f. 27. in p. 1608., and our No. 22. in p. 1516.
fúsca, f. 83. in p. 1618., and our No. 52. var. 1. in p. 1537.
geminàta, f. 129. in p. 1627., and our No. 93. in p. 1560.
glaúca, f. 68. in p. 1616., and our No. 61. in p. 1544.
grisonénsis, f. 99. in p. 1620., and our No. 128. in p. 1576.
grisophýlla, f. 119. in p. 1625., and our No. 101. in p. 1565.
hastàta, f. 35. in p. 1611., and our No. 163. in p. 1592.
Hèlix, f. 2. in p. 1603., and our No. 2. in p. 1491.
herbàcea, f. 62. in p. 1615., and our No. 161. in p. 1590.
hírta, f. 113. in p. 1623., and our No. 105. in p. 1567.
Hoffmanniàna, f. 16. in p. 1606., and our No. 13. in p. 1500.
Houstoniàna, f. 11. in p. 1604., and our No. 40. in p. 1532.
Humboldtiàna, f. 8. in p. 1604., and our No. 29. in p. 1529.
helvética, No. 159. in *Sal. Wob.*, and our No. 113. in p. 1570.
incàna, f. 90. in p. 1619., and our No. 73. in p. 1548.
incanéscens, f. 120. in p. 1625., and our No. 87. in p. 1557.
incubàcea, f. 79. in p. 1618., and our No. 52. var. 5. in p. 1539.
Kitaibeliàna, f. 64. in p. 1616., and our No. 157. in p. 1589.
lacústris, f. 116. in p. 1624., and our No. 102. in p. 1566.
Lambertiàna, f. 3. in p. 1603., and our No. 3. in p. 1492.
lanàta, f. 71. in p. 1617., and our No. 164. in p. 1593.
lanceolàta, f. 14. in p. 1605., and our No. 10. var. 3. in p. 1497.

App. iii. *Koch's Arrangement of the Species of* Sàlix *indigenous to Europe; including, also, some extra-European Species, with references to the pages in this work, where each species is described.* (See p. 1487.)

ANALYSIS OF THE GROUPS.

Catkins sessile on the points of the branchlets. Leaves below the catkins, proceeding from the sides of the branchlets - - -	viii.	CHRYSA'NTHÆ.
Catkins originating in terminal buds, seated on leafy peduncles, having new buds. Peduncles permanent, and containing the branchlets -	x.	GLACIA'LES.
Terminal bud, and generally several more next the point of the branchlets, producing leaves; the intermediate lateral ones, catkins.		
Scales of the catkins of one colour, yellowish green; falling off before the fruit is ripe - - - - - - - - - - -	i.	FRA'GILES.
Scales of the catkins of one colour, yellowish green, permanent -	ii.	AMYGDA'LINÆ.
Scales of the catkins discoloured at the point.		
Anthers, after flowering, black - - - - - - - - -	iv.	PURPU'REÆ.
Anthers, after flowering, yellow or brown.		
Capsules on long stalks, which are at least twice as long as the gland.		
Tall, erect, or arborescent shrubs - - - - - -	vi.	CA'PREÆ.
Low shrubs, with a creeping procumbent stem - -	vii.	ARGE'NTEÆ.
Capsules sessile, or with very short stalks.		
Catkins sessile. Leaves cuspidate, acuminate, serrated -	iii.	PRUINO'SÆ.
Catkins sessile. Leaves entire, or very slightly toothed -	v.	VIMINA'LES.
Catkins stalked. Stalk leafy - - - - - - - -	ix.	FRI'GIDÆ.

Group i. *Frágiles.*

Catkins lateral; the fertile ones on a leafy peduncle. Scales of the catkin of one colour, yellowish green, falling off before the fruit is ripe. Large trees.

1. *S.* pentándra *L.* Syn.: *S.* polyándra *Schrank Baier. Fl.*; *S.* tetrándra *Willd. Enum. Suppl.*; *S.* hermaphrodítica *Lin. Sp. Pl.*; No. 16. in p. 1503.
2. *S.* cuspidàta *Schultz.* Syn.: *S.* Meyeriàna Willd. Baum.; *S.* tinctòria *Smith* in *Rees's Cyclo.*; *S.* pentándra *β Lin. Fl. Suec.*; *S.* hexándra *Ehrh. Arb.*; *S.* Ehrhartiàna Smith in Rees's Cycl.; No. 17. in p. 1504.
3. *S.* frágilis *L.* Syn.: *S.* decípiens *Hoffm. Sal.*, *Eng. Bot.*; *S.* frágilis *Smith* in *Rees's Cyclo.*; *S.* Wargiàna Lej. Fl. d. Spa.; *S.* frágilis Wargiàna Lej. Revue; No. 22. in p. 1516., and No. 20. in p. 1515.
4. *S.* Russelliàna Smith. Syn.: *S.* péndula *Ser. Sal. Helv.*; *S.* víridis *Fries Nov.*; *S.* rùbens *Schrank Baier. Fl.*; No. 24. in p. 1517.
5. *S.* álba *L.* Syn.: *S.* cærùlea *Eng. Bot.*; *S.* vitellìna *Lin. Sp. Pl.*; No. 26. in p. 1522.; and No. 27. in p. 1528.

To this group belong, also, the following extra-European species:—

1. *S.* occidentàlis *Bosc*; p. 1530.
2. *S.* nìgra *Mühl. Nov. Act. Soc. n. s. Ber.*; *S.* caroliniàna *Michx. Amer.*; No. 28. in p. 1529.
3. *S.* babylónica *L.*; *S.* propéndens *Ser. Sal. Helv.*; No. 19. in p. 1507.
4. *S.* octándra *Sieb.*; p. 1530.
5. *S.* Humboldtiàna Willd.; No. 29. in p. 1529.

Group ii. *Amygdálinæ.*

Catkins lateral, the fertile ones on a leafy peduncle. Scales of the catkins of one colour, yellowish green, permanent. Leaves long, serrated, smooth. Tall shrubs, with pliable shoots.

6. *S.* amygdálina *L.* Syn.: *S.* triándra *Lin. Sp. Pl.*, *Willd. Sp. Pl.*; *S.* Villarsiàna Willd. Sp. Pl.; *S.* Hoppeàna Willd. Sp.; No. 14. in p. 1500.; No. 12. in p. 1498.; No. 15. in p. 1502.; and No. 13. in p. 1500.
7. *S.* undulàta *Ehrh.* Syn.: *S.* lanceolàta *Smith Eng. Bot.*; *S.* No. 37. and 38., *Trevir. Obs. Bot.*; No. 10. in p. 1496.
8. *S.* hippophaëfòlia *Thuil.* Syn.: *S.* undulàta *Trev. Obs. Bot.*, p. 17., *Koch* in *Regensb. Bot. Zeit.*, 1820, p. 311.; No. 11. in p. 1498.

Between this and the next group must be placed the three following North American species: —

1. *S.* Mühlenbergiàna Willd. Sp. Pl.; *S.* trístis *Mühl. Nov. Act. Soc. n. s. Berol.*; *S.* incàna *Michx.*; *Fl. Bor. Amer.*; No. 45. and No. 46. in p. 1534.
2. *S.* grìsea *Willd. Sp. Pl.*; *S* serícea *Mühl. Nov. Act. Soc. Berol.*, not of Villars, is the *S.* petiolàris *Smith Fl. Br.*; No. 42. and No. 43. in p. 1533.
3. *S.* cordàta *Mühl. Nov. Act. Soc. Berol.*, *Willd. Sp. Pl.*; No. 47. in p. 1534.

Group iii. *Pruinòsæ.*

Catkins lateral, the fertile ones also sessile. Capsules sessile. Stamens 2, distinct; anthers, after shedding their pollen remaining yellow. Scales of the catkins discoloured at the point. Leaves cuspidate acuminate, serrated, becoming smooth. Inner bark yellow in the summer. Tall shrubs or trees, of a bright green hue.

9. *S.* acutifòlia *Willd.* Syn.: *S.* violàcea *Ander. Rep.*, *Smith* in *Rees's Cyclo.*; *S.* cáspica *Hort.*; No. 7. in p. 1494.
10. *S.* daphnöìdes *Villars.* Syn.: *S.* præ'cox *Hoppe* in *Sturm D. Fl.*, *Willd. Sp. Pl.*; *S.* bigémmis *Hoffm. Fl. Germ.*, *Hist. Sal.*; *S.* cinèrea *Smith Fl. Br.*, *Willd Sp.*; *S.* pomeránica *Willd. Enum. Suppl.*; *S.* præ'cox gemmàta *Ser. Sal. exsicc.*, No. 83.; No. 8. in p. 1494., and No. 9. in p. 1496.

Group iv. *Purpùreæ.*

Catkins lateral, sessile; their scales dark or purple at the extremity. Stamens 2, united as far as the middle, or the point; anthers purple, becoming black after flowering. Inner bark yellow in the summer. Tall shrubs or trees, with a glaucous or dull green hue.

11. *S.* Pontederàna Willd. Sp. Pl.; No. 85. in p. 1555.
12. *S.* purpùrea *L.* Syn.: *S.* monándra *Hoffm. Sal.*; *S.* Lambertiàna Smith Fl. Br.; *S.* Hèlix *Willd. Enum.*, *Link Enum.*; *S.* monándra sericea *Ser. Sal. Helv.*; No. 1. in p. 1490., No. 4. and No. 3. in p. 1492.; and No. 2. in p. 1491.
13. *S.* rùbra *Hudson.* Syn.: *S.* fissa *Ehrh.*, *Dec.*, *Hoffm. Sal.*; *S.* membranàcea *Thuil. Paris.*, *S.* viréscens *Vill. Delph.*; *S.* olivàcea *Thuil. Paris.*; *S.* Forbyàna Smith Fl. Br.; No. 6. in p. 1493., and No. 5. in p. 1492.

Group v. *Viminàles.*

Catkins lateral, sessile; the scales brownish or dark at the point. Stamens 2, distinct, rarely united at the base; the anthers yellow as they go off. Capsules sessile, or on short stalks, which are not longer than the gland. Leaves long, entire, or finely toothed; covered on the under side with a silky or thick down. Tall shrubs, sometimes arborescent. *S.* viminàlis is the tallest and handsomest species, and the most valuable for its twigs for wickerwork, which are longer and stronger than those of any other species.

14. *S.* mollíssima *Ehrh.* and *Willd.*, but not of Smith. Syn.: *S.* pùbera *Koch* in *Bonning. Fl. Mon.*; No. 78. in p. 1551.
15. *S.* viminàlis *L.* Syn.: *S.* longifòlia *Lam. Fl. Fr.*; No. 75. in p. 1549.
16. *S.* stipulàris *Smith*; No. 76. in p. 1550.
17. *S.* acuminàta *Smith*, but not of Hoffm., Willd., or any German author. Syn.: *S.* Smithiàna Koch in Regensb. Bot Zeit., 1820, p. 276.; *S.* mollíssima *Smith Fl. Br.*; *S.* lanceolàta *Fries Fl. Hall.*; *S.* mollíssima *Koch* in *Reg. Bot. Zeit.*, 1820, p. 276.; No. 82. in p. 1553., and No. 77. in p. 1550.

Group vi. *Càpreæ.*

Catkins lateral, in flower sessile supported by a few leaves, in fruit usually placed on leafy stalks; scales dark or brownish at the point. Stamens 2, or but little united; anthers, after bursting, yellow. Capsules placed on stalks which are at least twice as long as the glands. Tall shrubs or trees.

18. *S.* incàna *Schrank.* Syn.: *S.* ripària *Willd. Sp. Pl.*; *S.* lavandulæfòlia *Lapeyr. Arb.*, *Ser. Sal. Helv.*; *S.* angustifòlia *Poir.* in *Du Ham. Arb.*; *S.* rosmarinifòlia *Gouan Hort.*, *Host Syn.*; *S.* Elæágnos *Scop. Carn.*; No. 73. in p. 1548.
19. *S.* Seringeàna Gaudin. Syn.: *S.* lanceolàta *Ser. Sal. Helv.*, not of Smith; *S.* holosericea *Ser. Sal. exsicc.*, not of Willd.; *S.* longifòlia *Schleich. Cat.*, not of Mühl.; p. 1602.
20. *S.* salviæfòlia *Link.* Syn.: *S.* pátula *Ser. Sal. Helv.*; *S.* oleifòlia *Ser. Sal. exsicc.*; *S.* oleifòlia *Vill. Delph.*; *S.* Flüggeàna Willd. Sp. Pl.; No. 212 in p. 1600.
21. *S.* holosericea *Willd.* Syn.: *S.* velutìna *Schrad.*; No. ? 220. in p. 1601.
22. *S.* cinèrea *L.* Syn.: *S.* acuminàta *Hoff.*, not of Smith; *S.* Hoffmanniàna Bluff. et Fing.; *S.* aquática *Smith Fl. Br.*; *S.* cinèrea *Smith Fl. Br.*; *S.* Timmii Schkuhr; *S.* oleæfòlia *Hort.*; ? *S.* rufinérvis *Dec.*; *S.* nìgra *Fl. Lusitan.*; No. 90. in p. 1558., and No. 91. in p. 1559.
23. *S.* grandifòlia *Seringe.* Syn.: *S.* stipulàris *Ser. Sal. exsicc.*, not of Smith; *S.* cineráscens *Willd. Sp. Pl.*; p. 1602.
24. *S.* càprea *L.* Syn.: *S.* tomentòsa *Ser. Sal. Helv.*; *S.* ulmifòlia *Thuil. Paris.* (see p. 1595.), *Gaud. Fl. Fr.*; *S.* aurigeràna *Lapeyr. Hist.*; *S.* lanàta *Vill. Delph.*; *S.* sphacelàta *Smith Fl. Br.*, *Willd. Sp. Pl.*; *S.* càprea β *Wahl. Carpat.*; No. 97. in p. 1561., and No. 98. in p. 1563.
25. *S.* aurita *L.* Syn.: *S.* rugòsa *Ser. Sal. Helv.*; *S.* uliginòsa *Willd. Enum.*; *S.* aurita *Willd. Enum.*; *S.* cladostémma *Hayne Dendr. Fl.*; No. 95. in p. 1560.
26. *S.* lívida *Wahl.* Syn.: *S.* arbúscula γ *Lin. Fl. Suec.*; *S.* arbúscula β *Lin. Sp. Pl.*; *S.* Starkeàna Willd. Sp. Pl.; *S.* foliòsa *Afzel.*, in ed. 2., *Fl. Lapp.*, *Willd. Sp. Pl.*; *S.* malifòlia *Bess. Galic.*; *S.* bicolor *Ehrh. Arb.*, *Fries Novit.*; No. 197. in p. 1598.
27. *S.* silesiaca *Willd.* Syn.: *S.* fagifòlia *Willd. Sp. Pl.*; No. 215. in p. 1601.
28. *S.* phylicifòlia *Linn.* Syn.: *S.* stylòsa *Gaud. Fl. Fr.*; *S.* stylàris *Ser. Sal. Helv.*; *S.* hastàta *Hoppe Fl. Rar. Cent.*; *S.* hýbrida *Hoffm. Deutsch. Fl.*; *S.* nìgricans *Smith Br. Fl.*, *Willd. Sp. Pl.*; *S.* Ammanniàna Willd. Sp. Pl.; *S.* Andersoniàna Smith Eng. Bot.; *S.* spirææfòlia *Willd.*, according to *Link's Enum.*; *S.* rupéstris *Smith Eng. Bot.*, *Rees's Cyclo.*; *S.* Forsteriàna Sm. Eng. Bot.; *S.* hirta *Smith Eng. Bot.*, *Willd. Sp. Pl.*; *S.* cotinifòlia *Smith Fl. Br.*, *Willd. Sp. Pl.*; *S.* ulmifòlia *Hort. Berol.*, not of Thuil.; *S.* Hálleri Ser. Sal. Helv.; *S.* carpinifòlia *Schleich.*, *Ser. Sal. Helv.* A great many of Schleicher's species are only variations of *S.* phylicifòlia. (See p. 1564.)
29. *S.* hastàta *L.* Syn.: *S.* Ludwígii Schk. Handb.; ? *S.* Pontedèra Vill.; *S.* serrulàta *Willd. Sp. Pl.*; *S.* malifòlia *Smith Fl. Br.*, *Willd. Sp. Pl.*; *S.* arbúscula *Wahl. Fl. Dan.*; *S.* arbúscula β *Lin. Fl. Suec.*; *S.* arbúscula *Lin. Sp. Pl.*, *Fl. Lapp.*; *S.* Wulfeniàna Willd. Sp. Pl.; *S.* phylicifòlia *Wulf.* in *Jacq. Coll.*; *S.* glàbra *Scop. Carn.*; No. 163. in p. 1592., and No. 224. p. 1601.
30. *S.* arbúscula *Wahl.* Syn.: *S.* arbúscula α *Lin. Fl. Suec.*, *Sp. Pl.*, not of Smith, Vahl, nor Jacq.; *S.* phylicifòlia *Smith Fl. Br.*; *S.* radìcans *Smith Fl. Br.*, *Willd. Sp. Pl.*; *S.* tétrapla *Walker*, *Link Enum.*; *S.* hùmilis *Willd. Ber. Baumz.*, *Enum. Suppl.*; *S.* Dicksoniàna Eng. Bot.; *S.* myrtilloìdes *Smith Fl. Br.*; *S.* Weigeliàna Willd. Sp. Pl.; *S.* tenuifòlia *Eng. Bot.*, not of Fl. Br.; *S.* laúrina *Sm. Tr. of Lin. Soc.*, *Willd. Sp. Pl.*; *S.* bícolor *Smith Fl. Br.*, var. β, is *S.* majális *Wahl. Fl. Lapp.*; *S.* tenuifòlia *Smith Fl. Br.*; *S.* petræ'a *Anders.*; *S.* Croweàna Smith Fl. Br., Eng. Bot., Willd. Sp.; ? *S.* díscolor *Schrad.*; ? *S.* Schraderiàna Willd. Sp. Pl. (See p. 1577.)

Group vii. *Argénteæ.*

Catkins and capsules as in the last, but the stature of the plant is different; for these are dwarf shrubs, with a subterranean creeping trunk. Stalks of the capsules, in all the species, longer than the gland, or very rarely, in some varieties, of the same length.

31. *S.* rèpens *L.* Syn.: *S.* fúsca *Lin. Sp. Pl.*, *Smith Fl. Br.*; *S.* depréssa *Hoff. D. Fl.*; *S.* rèpens *Smith Fl. Br.*; *S.* argéntea *Smith Fl. Br.*; *S.* lanàta *Thuil.*; *S.* parvifòlia *Smith* in *Rees's Cyclo.*, *Eng. Bot.*; *S.* adscéndens *Smith* in *Rees's Cyclo.*; *S.* incubàcea *Thuil.* *S.* rostràta *Thuil.* and *S.* polymórpha *Ehrh.* are intermediate between *S.* fùsca *Smith* and *S.* rèpens *Smith*; No. 52. in p. 1536.
32. *S.* rosmarinifòlia *L.* Syn.: *S.* incùbacea *Lin. Sp. Pl.*, *Willd. Sp. Pl.*; *S.* læ'ta *Schultz Suppl. Fl. Stutgard.*; *S.* heterophýlla *Schultz*; *S.* arbúscula *Smith Fl. Br.*; Nos. 48. and 49. in p. 1535.
33. *S.* ambígua *Ehrh.* Syn.: *S.* plicàta *Fries Fl. Hall.*; *S.* versifòlia *Ser. Sal. Helv.*; *S.* Schultziàna *Willd.*; *S.* spathulàta *Willd. Sp. Pl.*; *S.* prostràta *Smith Fl. Br.*; No. 54. in p. 1540.
34. *S.* finmárchica *Willd.* Syn.: *S.* onústa *Besser En. Pl. Volhyn.*; No. 55. in p. 1541.

35. *S.* myrtilloìdes *L.*, not of Willd. nor Smith. Syn.: *S.* élegans *Besser En. Pl. Volhyn.*; No. 150. in p. 1587.

Group viii. *Chrysánthæ.*

Catkins sessile, with small bract-like leaves at the base; produced at the ends of the branches of the previous year, or just below them, and placed above the leaf-buds.

36. *S.* lanàta *L.* Syn.: *S.* chrysánthos *Vahl Fl. Dan.*; *S.* depréssa *Lin. Fl. Suec.*, *Fl. Lapp.*; No. 164. in p. 1593.

Group ix. *Frígidæ.*

Catkins lateral, the fertile ones on leafy peduncles; scales dark or brown at the point. Stamens 2, distinct, or slightly joined. Anthers, after flowering, yellow or brown. Capsules sessile, or placed on stalks that are not longer than the gland. Branchy shrubs; the old branches knotted, and the younger ones hardly twiggy, or fit for basketwork.

37. *S.* limòsa *Wahl.* Syn.: *S.* nívea *Ser. Sal. Helv.*; *S.* helvética *Vill. Delph.*; *S.* bráctea *Debray. in den Denkschrif. d. Regensb. Bot. Ges.*, 2. p. 43.; *S.* arenària *Willd. Sp. Pl.*; *S.* leucophýlla *Willd. Enum. Suppl.*, *Berol. Baumz.*; *S.* arenària *Smith Fl. Br.*; *S.* canéscens *Willd. Sp. Pl.*; *S.* Stuartiàna Smith in Rees's Cyclo.; No. 67. and 68. in p. 1547.
38. *S.* glaúca *L.* Syn.: *S.* serícea *Vill. Delph.*; *S.* glaúca γ Lappònum *Wahl. Fl. Lapp.*; *S.* Lappònum *Lin. Sp. Pl.*, *Willd. Sp. Pl.*; *S.* álbida *Schleich. Cat.*; *S.* elæagnòides *Schleich. Cat.*, *Ser. Sal. Helv.*; *S.* appendiculàta *Vahl* in *Fl. Dan.*; *S.* glaúca β appendiculàta *Wahl. Fl. Lapp.*; No. 61. in p. 1544.
39. *S.* pyrenàica *Gouan.* Syn.: *S.* ciliàta *Dec. Fl. Fr.*; *S.* pyrenàica β ciliàta *Dec. Fl. Fr.*; No. 69. in p. 1547.
40. *S.* Waldsteiniàna Willd. Syn.: *S.* arbúscula *Jacq. Aus.*; *S.* ovàta *Ser. Sal. Helv.*, *Ser. Sal. exsicc.*; No. 70. in p. 1547.
41. *S.* prunifòlia *Smith.* Syn.: *S.* venulòsa *Smith Fl. Br.*; *S.* carinàta *Smith Fl. Br.*; *S.* formòsa *Willd. Sp. Pl.*; *S.* fœ'tida *Schleich. Cent.*; *S.* alpìna *Sut. Helv.*; *S.* vacciniifòlia *Eng. Bot.*, *Rees's Cyclo.*; Nos. 145, 146, and 147. in p. 1585.; and No. 148. in p. 1586.
42. *S.* cæ'sia *Vill.* Syn: *S.* prostràta *Ehrh. Pl. Select.*; *S.* myrtilloìdes *Willd. Sp. Pl.*, not of Lin. nor of Smith; No. 149. in p. 1586.
43. *S.* *Myrsinìtes Lin.* Syn.: *S.* arbutifòlia *Willd. Sp. Pl.*, *Ser. Sal. Helv.*; *S.* dùbia *Sut. Fl. Helv.*; *S.* retùsa *Dicks.*; No. 153. in p. 1588.
44. *S.* Jacquínii Host. Syn.: *S.* fúsca *Jacq. Austr.*, not of Lin.; *S.* alpìna *Scop. Carn.*; *S.* Jacquiniàna Willd. Sp. Pl.; No. 196. in p. 1598. *S.* árctica *R. Br.* seems intermediate between *S.* Jacquínii and *S.* reticulàta; p. 1602.

Group x. *Glaciàles.*

From the terminal bud of the branches of the preceding year, proceeds a new branch clothed with leaves, having the buds for a future year in their axils; and on the top of this is placed a catkin. The catkins, therefore, are seated upon a leafy permanent peduncle, by which the branch is continued and lengthened. Very small shrubs, with subterranean creeping trunks, and ascending branches.

45. *S.* reticulàta *Lin.*; No. 159. in p. 1543.
46. *S.* retùsa *Lin.* Syn.: *S.* Kitaibeliàna Willd. Sp. Pl., Wahl. Carpat.; *S.* serpyllifòlia *Scop. Carn.*, *Willd. Sp. Pl.*, *Jacq. Austr.*; Nos. 156. and 157. in p. 1589., and No. 159. in p. 1590.
47. *S.* herbàcea *Lin.*; No. 161. in p. 1590.
48. *S.* polàris *Wahl.*; No. 162. in p. 1591.

The following species, Koch states, are not sufficiently known to him to be comprehended in any of the preceding groups: — *S.* violàcea *Willd.* and *S.* Treviràni Spreng., which are in the Botanic Garden, Erlangen, but have not yet (1828) flowered. The following Koch had not seen: — *S.* versifòlia *Wahl.*, *S.* punctàta Wahl., *S.* corúscans *Willd.*, *S.* cineráscens *Willd.*, *S.* refléxa *Willd.*, *S.* rufinérvis *Dec.*, *S.* canaliculàta *Bess.*, and *S.* campéstris *Fries.* Very many of these are, probably, either synonymes or varieties of those already described; as are the following: — *S.* spléndens, rùbens, iseràna, sepetifòlia, and multiflòra *Presl*; and *S.* refléxa sedinénsis and Pseùdo-càprea *Compend. Fl. Ger.*

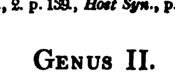
App. iv. *Kinds of Sàlix described in Host's* Flora Austriaca, *and figured in Host's* Salix.

The very few identifications given are those of Host.

Sàlix álba, m. and f., *Fl. Aus.*, 2. p. 638., *Sal.*, t. 32. and 33.
alpéstris, m. and f., *Fl. Aus.*, 2. p. 653., *Sal.*, t. 99. and 100.; *S.* Waldsteiniàna Willd. Sp. Pl., 4. p. 679.; *S.* Hostiàna Willd. Mag., 1810, p. 63.
amygdálina, m. and f., *Fl. Aus.*, 2. p. 634., *Sal.*, t. 13. and 14.
austrìaca, m. and f., *Fl. Aus.*, 2. p. 646., *Sal.*, t. 64. and 65.
aurita, m. and f., *Fl. Aus.*, p. 648., *Sal.*, t. 78.
càprea, m. and f., *Fl. Aus.*, 2. p. 646., *Sal.*, t. 66. and 67., *Lin. Sp. Pl.*, 1448.; *Willd. Sp. Pl.*, 4. p. 703.
carnìólica, m. and f., *Fl. Aus.*, 2. p. 641., *Sal.*, t. 44. and 45.
cinèrea, m. and f., *Fl. Aus.*, 2. p. 637., *Sal.*, t. 26. and 27.; *S.* daphnoìdes *Vill. Delph.*, 3. p. 765. t. 5. f. 2.; *S.* præ'cox *Hoppe.*
cóncolor, m. and f., *Fl. Aus.*, 2. p. 639., *Sal.*, t. 34. and. 35.; *S.* minima, &c., *Raii Syn.*, p. 449., applied by Smith in *Eng. Fl.*, 4. p. 192., to *S.* rùbra *Huds.*
corúscans, m. and f., *Fl. Aus.*, 2. p. 651., *Sal.*, t. 94., *Willd. Sp. Pl.*, 4. p. 681.; *S.* arbúscula *Jacq. Aus.*, t. 408., *Host Syn.*, p. 527.
díscolor, m. and f., *Fl. Aus.*, 2. p. 645., *Sal.*, t. 60. and 61.
élegans, m. and f., *Fl. Aus.*, 2. p. 652., *Sal.*, t. 97.
excélsior, m. and f., *Fl. Aus.*, 2. p. 638., *Sal.*, t. 28. and 29.
flavéscens, m. and f., *Fl. Aus.*, 2. p. 653., *Sal.*, t. 101.
frágilis, m. and f., *Fl. Aus.*, 2. p. 635., *Sal.*, t. 18. and 19.
fragílior, m. and f., *Fl. Aus.*, 2. p. 636., *Sal.*, t. 20. and 21.; *S.* frágilis *Host Syn.*, p. 527.
fragilíssima, m. and f., *Fl. Aus.*, 2. p. 636., *Sal.*, t. 22. and 23.

Sàlix glaucéscens, m. and f., *Fl. Aus.*, 2. p. 648., *Sal.*, t. 76. and 77.
Hèlix, m. and f., *Fl. Aus.*, 2. p. 639., *Sal.*, t. 36. and 37.
herbàcea, m. and f., *Fl. Aus.*, 2. p. 652., *Sal.*, t. 104., *Lin. Sp. Pl.*, 1445., *Fl. Lapp.*, No. 355., *Fl. Dan.*, t. 117., *Eng. Bot.*, t. 1907.
heterophýlla, m. and f., *Fl. Aus.*, 2. p. 650., *Sal.*, t. 87. and 88.
intermèdia, m. and f., *Fl. Aus.*, 2. p. 644., *Sal.*, t. 56. and 57.
Jacquiniàna, m. and f., *Fl. Aus.*, 2. p. 654., *Sal.*, t. 102., *Host Syn.*, p. 529., *Willd. Sp. Pl.*, 4. p. 692. ; *S.* fúsca *Jacq. Aus.*, t. 409.
ligústrina, m. and f., *Fl. Aus.*, 2. p. 634., *Sal.*, t. 15. and 16.
litoràlis, m. and f., *Fl. Aus.*, 2. p. 643., *Sal.*, t. 52.
longifòlia, m. and f., *Fl. Aus.*, 2. p. 645., *Sal.*, t. 62. and 63.
menthæfòlia, m. and f., *Fl. Aus.*, 2. p. 649., *Sal.*, t. 79. and 80. ; *S.* Myrsinìtes *Wulfen* in *Jacq. Coll.*, 2. p. 136., *Hoffm. Sal.*, 1. p. 71. t. 17., f. 1., &c., *Host Syn.*, p. 527.
mirábilis (androgynous) *Fl. Aus.*, 2. p. 641., *Sal.*, t. 46.
monándra, m. and f. *Fl. Aus.*, 2. p. 647., *Sal.*, t. 71. and 72.
montàna (androgynous) *Fl. Aus.*, 2. p. 647., *Sal.*, t. 73.
mutábilis, m. and f., *Fl. Aus.*, 2. p. 640., *Sal.*, t. 42. and 43.
oppositifòlia, m. and f., *Fl. Aus.*, 2. p. 640., *Sal.*, t. 38. and 39. ; *S.* humílior, &c., *Raii Syn.*, 445. This name is applied as a synonyme to *S.* Hèlix *L.*, by Smith in his *English Flora*, 4. p. 188.
ovàta, m. and f., *Fl. Aus.*, 2. p. 648., *Sal.*, t. 74. and 75.
palústris, m. and f., *Fl. Aus.*, 2. p. 637., *Sal.*, t. 24. and 25.
parietariæfòlia, m. and f., *Fl. Aus.*, 2. p. 650., *Sal.*, t. 85. and 86.
parviflòra, m. and f., *Fl. Aus.*, 2. p. 642., *Sal.*, t. 49.
pentándra, m. and f., *Fl. Aus.*, 2. p. 632., *Sal.*, t. 1. and 2., *Lin. Sp. Pl.*, 1442., *Eng. Bot.*, t. 1805., *Smith*.
polymórpha, m. and f., and with the sexes monœcious, *Fl. Aus.*, 2. p. 646., *Sal.*, t. 68, 69, and 70.
praténsis, m. and f., *Fl. Aus.*, 2. p. 642., *Sal.*, t. 50. and 51. ; *S.* angustifòlia *Wulfen* in *Jacq. Coll.*, 3. p. 48. ; *S.* rosmarinifòlia *Wulf.*, l. c. ; *S.* incubàcea *Host Syn.*, p. 528.
prunifòlia, m. and f., *Fl. Aus.*, 2. p. 649., *Sal.*, t. 83. and 84.
pulchélla, m. and f., *Fl. Aus.*, 2. p. 653., *Sal.*, t. 98.
purpùrea, m. and f., *Fl. Aus.*, 2. p. 640., *Sal.*, t. 40. and 41.
rèpens, m. and f., *Fl. Aus.*, 2. p. 643., *Sal.*, t. 53.
reticulàta, m. and f., *Fl. Aus.*, 2. p. 655., *Sal.*, t. 105., *Lin. Sp. Pl.*, 1446., *Fl. Lapp.*, No. 359. t. 78., *Fl. Dan.*, t. 212., *Eng. Bot.*, t. 1908., *Smith*.
retùsa, m. and f., *Fl. Aus.* 2. p. 654., *Sal.*, t. 103., *Lin. Sp. Pl.*, 1493., *Willd. Sp. Pl.*, 4. p. 684. ; *S.* serpyllifòlia *Scop. Carn.*, 2. p. 255. t. 6., *Willd. Sp. Pl.*, 4. p. 684. ; *S.* Kitaibeliàna Willd. Sp. Pl., 4. p. 684.
ripària, m. and f., *Fl. Aus.*, 2. p. 644., *Sal.*, t. 48. and 59. ; *S.* incàna *Schrank Baier.*, 1. p. 230. ; *S.* rosmarinifòlia *Schrank Sal.*, No. 38., *Host Syn.*, 529.
rivàlis, m. and f., *Fl. Aus.* 2. p. 649., *Sal.*, t. 81. and 82.
semperflòrens, m. and f., *Fl. Aus.*, 2. p. 633., *Sal.*, t. 5. and 6.
spectábilis, m. and f., *Fl. Aus.*, 2. p. 682., *Sal.*, t. 3. and 4.
speciòsa, m. and f., *Fl. Aus.*, 2. p. 635., *Sal.*, t. 17.
Starkeàna, m. and f., *Fl. Aus.*, 2. p. 650., *Sal.*, t. 89. and 90., *Willd. Sp. Pl.*, 4. p. 677. ; *S.* malifòlia *Besser Fl.*, 2. p. 313.
sudética, m. and f., *Fl. Aus.*, 2. p. 651., *Sal.*, t. 91. and 92.
tenuiflòra, m. and f., *Fl. Aus.*, 2. p. 633., *Sal.*, t. 7. and 8.
ténuis, m. and f., *Fl. Aus.*, 2. p. 642., *Sal.*, t. 47. and 48.
tomentòsa, m. and f., *Fl. Aus.*, 2. p. 651., *Sal.*, t. 93., *Host Syn.*, p. 528.
vària, m. and f., *Fl. Aus.*, 2. p. 634., *Sal.*, t. 11. and 12.
venústa, m. and f., *Fl. Aus.*, 2. p. 633., *Sal.*, t. 9. and 10.
viminàlis, m. and f., *Fl. Aus.*, 2. p. 643., *Sal.*, t. 54. and 55., *Lin. Sp. Pl.*, 2448. ; *Willd. Sp. Pl.*, 4. p. 706., *Hoffm. Sal.*, 1. t. 2. f. 1, 2. t. 5., &c., *Smith Fl. Br.*, p. 1070.
vitellìna, m. and f., *Fl. Aus.*, 2. p. 638., *Sal.*, t. 30. and 31.
Wulfeniàna, m. and f., *Fl. Aus.*, 2. p. 651., *Sal.*, t. 95. and 96., *Willd. Sp. Pl.*, 4. p. 660. ; *S.* phylicifòlia *Wulfen* in *Jacq. Coll.*, 2. p. 139., *Host Syn.*, p. 526.

Genus II.



PO'PULUS *Tourn.* The Poplar. *Lin. Syst.* Diœ'cia Octándria.

Identification. Tourn. Inst., t. 350. ; Lin. Gen., 526. ; Theo. Nees ab Esenbeck Gen. Pl. Germ. Illust. ; Smith's Engl. Fl., 4. p. 242.
Synonymes. Peuplier, *Fr.* ; Pappel, *Ger.* ; Pioppo, *Ital.* ; Poplier, *Dutch* ; Alamo, *Span.*
Derivation. Some suppose the word *Pópulus* to be derived from *pallō*, or *paipallō*, to vibrate or shake ; others, that the tree obtained its name from its being used, in ancient times, to decorate the public places in Rome ; where it was called *arbor populi*, or the tree of the people. Bullet derives the name also from *populus*, but says that it alludes to the leaves being easily agitated, like the people. From the Spanish name for this tree, *alamo*, is derived the word *alameda*, the name given to public walks in Spain, from their being generally planted with poplars.

Description. All the species are deciduous trees, mostly growing to a large size ; natives of Europe, North America, some parts of Asia, and the north of Africa. They are all of rapid growth, some of them extremely so ; and they are all remarkable for a degree of tremulous motion in their leaves, when agitated by the least breath of wind. The poplar is diœcious ; and the catkins of the males of most of the species are very ornamental, from the red

tinge of their anthers, and from their being produced very early in spring, when the trees are leafless, and when flowers are particularly valuable from their rarity. The catkins are also, in most species, so numerous, that the effect of the mass of red, when the tree is seen from a little distance, and in a strong light, is very striking. The colour of the anthers of some of the species is so deep, and their size is so large, that a correspondent of the *Magazine of Natural History* compares them, when torn off by a high wind, and lying on the ground, to "great red caterpillars." (See vol. vi. p. 198.) The females of all the species have their seeds enveloped in abundance of cottony down; which, when ripe, and the seeds are shed, adheres to every object near it; and is so like cotton wool in appearance and quality, that it has been manufactured into cloth and paper, though it has been found deficient in elasticity. The buds of *P.* balsamífera, and all its allied species, are covered with a viscid matter, which is said to be of use in medicine. *P.* álba, *P.* (a.) canéscens, and their varieties, are easily distinguishable from all the other species, even at a considerable distance, when their leaves are ruffled by the wind, from the thick white cottony down which covers their under surface. The tremulous motion of the leaves, which is common, in a greater or less degree, to all the poplars, proceeds from the great length of the petioles, in proportion to the size and weight of the leaves to which they are attached. Pliny speaks of three kinds of poplar: the black, the white, and the poplar of Libya. He mentions that the poplar was cultivated as a prop to the vine (*Plin.*, lib. xvi. cap. 23. and cap. 37.); and that the trees were planted in quincunx, in order that they might obtain more light and air. He also says that the wood of the poplar, like that of the willow, and of all the aquatic trees, is particularly suitable for making bucklers, from its lightness; and because, when struck, the blow only indents the soft wood, without piercing or cracking it. The poplar buckler thus acted like a shield of Indian rubber, or any other elastic substance, and repelled the blow. The ancients applied the leaves of the poplar, macerated in vinegar, to parts affected by the gout; and they dried the young shoots with the leaves on during summer, and laid them by, to serve as winter food for cattle. The wood of the poplar is soft, light, and generally white, or of a pale yellow. It is but of little use in the arts, except in some departments of cabinet and toy making, and for boarded floors; for which last purpose it is well adapted, from its whiteness, and the facility with which it is scoured; and, also, from the difficulty with which it catches fire, and the slowness with which it burns. In these respects, it is the very reverse of deal. Poplar, like other soft woods, is generally considered not durable; but this is only the case when it is exposed to the external atmosphere, or to water; and hence the old distich, said to be inscribed on a poplar plank,—

> "Though heart of oak be e'er so stout,
> Keep me dry, and I'll see him out,"

may be considered as strictly correct. One of the most valuable properties of the poplar is, that it will thrive in towns in the closest situations; and another is, that, from the rapidity of its growth, it forms a screen for shutting out objects, and affords shelter and shade sooner than any other tree. The females of several of the exotic kinds of poplar have never been introduced into Britain; and, consequently, little opportunity has been found for raising new varieties from seeds; but all the kinds, whether indigenous or foreign, are readily propagated by cuttings or layers, and some of them by suckers. They all like a moist soil, particularly when it is near a running stream; but none of them thrive in marshy or undried soil, as is commonly supposed. On very dry ground, the leaves of the poplar grow yellow, and fall off much sooner than when they are planted in a more congenial situation; but the timber, in dry soils, is said to be more compact, fine-grained, and durable. *P.* álba and its varieties produce their leaves much earlier than *P.* nìgra and its varieties. The species and varieties belonging to this genus are in a state of confusion,

from which it will be impossible entirely to extricate them, till both the male and female plants of each sort have been cultivated together for a number of years in the same garden. Judging from the plants in the London nurseries, and in the arboretums of the Horticultural Society and Messrs. Loddiges, we think that all the kinds now in actual cultivation in Britain may be included under the heads of *P.* álba, *P.* trémula, *P.* nìgra, and *P.* balsamífera.

Poplars, from their rapid growth and great bulk, are liable to have their branches broken off by the wind; in which case, if care is not taken to protect the wound from the weather, the water enters, and the trunk soon rots and becomes the prey of insects, which in their turn are fed on by birds. The larvæ of a number of moths live on the leaves of the poplars, such as Tórtrix populàna, *B*ómbyx pópuli, Cerùra vínula, Smerínthus pópuli, *S.* ocellàtus (the eyed hawk moth), Anacámpsis populélla, and a number of others, some of which will be noticed under particular species. The larvæ of *C*óssus Lignipérda (see p. 1386.), of *Æ*gèria *c*rabronifórmis (see *Mag. Nat. Hist.*, iv. 445.), and of some others, live on the wood. The larva of the puss moth (Cerùra vínula) is one of the few caterpillars that are known to have the voluntary power of communicating electricity. An interesting account of the manner in which this was discovered by a naturalist in Selkirkshire, is given in the *Magazine of Natural History*, vol. iv. p. 281. The larva of this insect is very common on poplars and willows in Switzerland, where the pupa often remains two full years, before it assumes the perfect state. (*Ibid.*, viii. 558.) *P*ópulus græ`ca affords food to this moth, to the poplar hawk moth (Smerínthus pópuli), to the kitten moth (Cerùra fúrcula), to the pebble prominent moth (Notodónta *zíczac*), and to various species of Clostèra, (the chocolate-tipped moths), which feed exclusively on the poplar and willow. The larva of Smerínthus pópuli (*Mag. Nat. Hist.*, viii. 629.) is very common both on poplars and willows, and often strips them entirely of their foliage; the moth of this species is seldom seen, as it flies but little, and only during the night. The larva of Smerínthus ocellàtus is common on willows and poplars from July to the end of September, and the fly does not usually appear till the following spring. It is stated of this insect, that a female produced young without having any connexion with the male; from which it would appear that in certain Lepidóptera a single pairing can render fertile more than one generation, as well as in the case of the A′phides. (*Mag. Nat. Hist.*, viii. 557.) Trochílium *a*pifórme (the hornet hawk moth) and *Æ*gèria *a*silifórmis feed on the Lombardy poplar, on which the larva may be found in May and June, early in the morning; the fly almost invariably mounts to the top of the trees soon after sunrise. (*Ibid.*, p. 555.) The splendid European butterfly (not yet detected in Great Britain), Limenìtis pópuli, frequents the aspen. The caterpillar, also, of the fine Camberwell beauty, or, as it used to be called, the poplar butterfly, feeds on the poplar. Both poplars and willows, when the trunks begin to decay, are attacked by the jet ant (*F*ormìca fuliginòsa), more especially in France, and on this insect that very shy bird, the hoopoe chiefly lives. Among the coleopterous insects, Rhynchìtes pópuli, Chrysomèla pópuli and C. trémulæ, *S*apérda populnea, and Orchéstes pópuli, one of the flea weevils, feed on the leaves of poplars. Notices of all the preceding insects, and of various others which attack the poplar and the willow, will be found in the *Magazine of Natural History*, vols. i. to ix. inclusive. Various epiphytical fungi are found on the poplar, some of them on the leaves, and others on the bark of the branches or trunk; such as Scleròtium *p*opùlinum *Pers.*, *E*rýsiphe adúnca *Link* and *E.* pópuli *Link*, Eríneum aúreum *Pers.*, *U*rèdo popùlina *Pers.*, and *U.* ovàta *Straus*. Some others will be noticed under particular species; and the greater part are included among the Cryptogàmia of our *Encyclopædia of Plants*, where several of the species are figured.

‡ 1. *P.* A′LBA *L.* The white Poplar, *or Abele Tree.*

Identification. Lin. Sp., 1463.; Willd. Sp. Pl., 4. p. 802.; Smith Eng. Bot., t. 1618.; Eng. Fl., 4. p. 243.; Hook. Brit. Fl., ed. 2., p. 432.; Mackay Fl. Hibern., pt. 1. p. 254.; Raii Syn., 446.; Ger. Enum., 1486.; Bauh. Hist., 1. p. 2. fig. 160.

Synonymes. *P.* álba latifòlia *Lob. Ic.*, 2. p. 193. fig. 1.; *P*ópulus No. 1634. *Hall. Hist.*, 2. p. 303.; *P.* màjor *Mill. Dict.*, 8. No. 4.; *P.* nívea *Willd. Arb.*, 227.; *P.* álba nívea *Mart. Mill.* The name

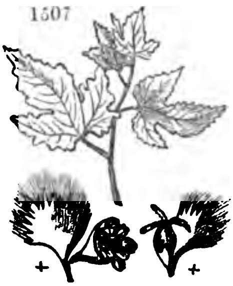
of Leukē, given to this species by Dioscorides, is still used among the modern Greeks. (See *Smith Prod.*, *Sibth. Fl. Græca.*) The great white Poplar, great Aspen, Dutch Beech; Peuplier blanc, Ypréau, Blanc de Hollande, Franc Picard, *Fr.*; Aubo, or Aoubero, in some provinces; weisse Pappel, Silber Pappel, weisse Aspe, Weissalber Baum, *Ger.*; Abeelboom, *Dutch.*

Derivation. The specific name of White applies to the under surface of the leaves, which, when quivering in the wind, give the tree a peculiarly white appearance. The English name of Abele is derived from the Dutch name of the tree, Abeel; and this name is supposed by some to be taken from that of the city of Arbela, in the plains of Nineveh, near which, on the banks of the Tigris and Euphrates, great numbers of these trees grew. It is said to be the same tree as that mentioned in the *Bible* as Abel-shittim, Chittim, Shittim-wood, and Kittim. The Dutch Beech is an old name, given to this tree, as we are informed by Hartlib, in his *Compleat Husbandman* (1659), on account of ten thousand trees of it having been brought over all at once from Flanders, and planted in the country places; where the people, not knowing what they were, called them Dutch beech trees. The French name of Ypréau alludes to the tree being found in great abundance near the town of Ypres.

Engravings. Eng. Bot., t. 1618.; Ger. Em., 1488.; Bauh. Hist., 1. p. 160.; Matth. Valg., 1. p. 123. fig.; Cam. Epit., 65. fig.; Dod. Pempt., 835. fig.; Dalech. Hist., 86. fig.; Hayne Abbild., t. 202.; our *fig.* 1507.: and the plate of this tree in our last Volume.

The Sexes. Both sexes are described in the *English Flora*, and are not unfrequent in plantations. Trees of both are in the Horticultural Society's Garden.

1507



Spec. Char., *&c.* Leaves lobed and toothed; somewhat heart-shaped at the base; snow-white, and densely downy beneath. Catkins of the female plant ovate. Stigmas 4. (*Smith Eng. Fl.*) Root creeping, and producing numerous suckers. Branches very white, and densely downy when young. Leaves angular, and generally with three principal lobes, variously and unequally toothed, blunt-pointed, veiny; dark green and smooth above, and covered with a thick remarkably white down beneath. The leaves vary very much in form; and on young luxuriant branches they are almost palmate. The tree is a native of most parts of Europe, and is usually found in woods or thickets, in rather moist soil. It grows to the height of 80 ft. or 90 ft., and flowers in March.

Varieties. These are numerous, but the principal one, *P.* (a.) canéscens, being generally considered as a species, we shall first give it as such; and next enumerate the varieties which belong to it and to *P.* álba.

♀ 2. *P.* (A.) CANE'SCENS *Smith.* The grey, *or common white*, Poplar.

Identification. Smith Fl. Brit., p. 1080.; Eng. Bot., t. 1619.; Eng. Fl., 4. p. 243.; Willd. Sp. Pl., 4. p. 802.; Michx. North Amer. Sylva, 2. p. 245. t. 100.

Synonymes. *P.* álba *Mill. Dict.*, ed. 8., No. 1., *Willd. Arb.*, 227.; *P.* álba fòliis minòribus *Raii Syn.*, 446., Ger. Em., 148. fig., Lob. Ic., 2. 193. fig.; *P.* álba fòlio minòre *Bauh. Hist.*, v. 1. p. 2. 160. fig.; *P.* No. 1634. β *Hall. Hist.*, 2. 303.; Peuplier grisaille, *Fr.*

The Sexes. Only the female plant is expressly described in the *English Flora*. The plant in the Horticultural Society's Garden is the male.

Engravings. Eng. Bot., t. 1619.; Michx. North Amer. Sylva, t. 100.; Hayne Abbild., t. 201.; N. Du Ham., 2. fig. 52., as *P.* álba; and our *fig.* 1508.

Spec. Char., *&c.* Leaves roundish, deeply waved, toothed; hoary and downy beneath. Catkins of the female plant cylindrical. Stigmas 8. (*Smith* in *Eng. Fl.*) It is essentially distinguished from *P.* álba, as Mr. Crowe first discovered, by the stigmas, which are 8, spreading in two opposite directions. The bracteas of the fertile flowers are, also, more deeply and regularly cut. The branches are more upright and compact. The leaves are rounder, more conspicuously 3-ribbed, and less deeply or acutely lobed. They are downy beneath; but the down is chiefly greyish, and not so white or cottony as in *P.* álba: in some instances the leaves are glabrous. (*Smith.*) Smith has described the root as creeping as extensively as that of *P.* álba. *P.* canéscens is found wild in "wet ground in England, France, and Germany; sometimes also on open elevated spots, where the soil is loamy." (*Smith* in *Rees's Cycl.*) It grows to about the same height as *P.* álba, and flowers in March. "Mr. Crowe was very instrumental in bringing this tree into notice in Norfolk. He observed it to be of slower growth than *P.* álba. The wood, though till lately it was but little used or distinguished, is much firmer than that of any other British poplar; making as good floors as the best Norway fir in appearance; having, moreover, the valuable pro-

perty that it will not, like any resinous wood, readily take fire." (*Smith* in *Eng. Fl.*)

Varieties referable to one or other of the preceding kinds, most of them to *P.* álba.

♀ P. *a.* 2 *hýbrida* Bieb. Fl.Taur. Cauc., 2. p. 423., and Suppl., p. 633.; *P.* álba *Bieb.*, l. c.; ? *P.* intermèdia *Mertens*; *P.* a. crassifòlia *Mertens*; and *P.* grísea *Lodd. Cat.*, 1836; appears to be intermediate between *P.* álba and *P.* (a.) canéscens. It is plentiful in the neighbourhood of streams in Tauria and Caucasus; whence it appears to have been introduced into Britain in 1816. There is a female plant of this kind in the Horticultural Society's Garden, and young plants in Loddiges's arboretum.

♀ P. *a.* 3 *acerifòlia*; *P.* acerifòlia *Lodd. Cat.*, ed. 1836; *P.* quercifòlia *Hort.*; *P.* palmàta *Hort.*; is a very distinct variety of *P.* álba, with the leaves broad, and deeply lobed, like those of some kinds of *A*'cer.

♀ P. *a.* 4 *arembérgica*, *P.* arembérgica *Lodd. Cat.*, 1836, seems identical with *P.* (a.) acerifòlia; but the plants in Loddiges's collection, which were only received in 1835, are so small, that it is difficult to decide with certainty respecting them. Booth (*Gard. Mag.*, xi. p. 207.) describes it as growing much more rapidly than the old variety.

♀ P. *a.* 5 *bélgica*, *P.* bélgica *Lodd. Cat.*, ed. 1836, is also a kind removed from the Continent in 1835; but the plants in Messrs. Loddiges's collection are too small to admit of our stating anything more respecting them, than that they are evidently a variety of *P.* álba; probably identical with *P.* a. acerifòlia.

♀ P. *a.* 6 *cándicans*, *P.* cándicans *Lodd. Cat.*, ed. 1836, is a strong-growing variety of *P.* álba; probably also identical with *P.* acerifòlia. This is the *P.* tomentósa of the Hawick Nursery, and the hoary poplar of the Edinburgh nurseries, where it is propagated by layers, which make shoots 6 ft. or 8 ft. long the first season.

♀ P. *a.* 7 *nívea*, *P.* nívea *Lodd. Cat.*, differs very little, if at all, from the preceding variety.

♀ P. *a.* 8 *ægyptìaca* Hort., *P.* a. pállida *Hort.*, the Egyptian white poplar, is a much weaker-growing plant than any of the preceding varieties; though we have received specimens of this kind from the Hawick Nursery, and seen a tree bearing this name in the Horticultural Society's Garden, we can say very little about it. Messrs. Archibald Dickson and Son, of Hawick, state that it is unfit for planting for forest purposes.

Other Varieties. The late Professor Mertens of Bremen (as M. Fischer of Göttingen informed us in 1835) planted a number of different sorts of poplar on the ramparts of Bremen; and, in 1816, specimens of these were sent to Sir J. E. Smith, which are now in the herbarium of the Linnæan Society. Of these specimens, the most remarkable is

♀ P. *a.* 9 *pendula*, *P.* a. var. grácilis rámis pendéntibus *Mertens.* — The specimens of this variety are of both sexes; and we may presume, from the pendent shoots, that it would be a very desirable kind of poplar to have introduced, if it is not already in this country. There is a pendent-branched tree of *P.* álba in Lincoln's Inn New Square, which might probably retain its drooping character, if propagated by cuttings or grafting.

Description, &c. The white poplar, and its different varieties, form trees from 80 ft. to 100 ft. high, and upwards, generally with a clear trunk to a considerable height, and a spreading head, usually, in full-grown trees, but thinly clothed with foliage. The roots creep under the surface to a considerable distance from the tree, and send up suckers in abundance. The leaves of all the varieties are white underneath; those of *P.* (a.) canéscens least so; and those of *P.* a. nívea, and *P.* a. cándicans, so in the greatest degree. The leaves of the largest-growing varieties of the abele tree, are deeply lobed and indented; very dark above, and very white and downy beneath, with footstalks about 1 in. in length. The young shoots have a purplish tinge, and they are covered with a white down; but the bark of the trunk and of the

older branches is grey. In the beginning of April, the male catkins, which are generally about 3 in. in length, appear; and, about a week afterwards, the female catkins, which are shorter, come forth: a week after the expansion of the flowers of the female catkins, the males drop off; and, in five or six weeks afterwards, the seeds will have ripened and dropped also. The seeds are enclosed in a hairy or cottony covering; in consequence of which, they are wafted to a great distance by the wind. The growth of all the varieties is extremely rapid; so that a tree, 10 years planted, in soil moderately good and moist, will attain the height of 30 ft., or upwards, with a trunk from 6 in. to 9 in. in diameter; as has been the case with several trees in the Horticultural Society's Garden. As a proof of the rapidity of the growth of the abele tree, Evelyn mentions one of these trees at Syon, "which, being lopped in February, 1651, did, by the end of October, 1652, produce branches as big as a man's wrist, and 17 ft. in height." Truncheons of the white poplar, 9 ft. long, planted on the banks of a stream, some yards from the current, had, in 12 years, trunks nearly 10 in. in diameter; and had heads in proportion. (*Bath Soc. Papers*, 1786, vol. iii. p. 90.) The duration of the tree rarely exceeds two centuries; but, when it is to be cut down for timber, it should be seldom allowed to exceed 50 years' growth, as the heart-wood at that period, on most soils, begins to decay. Mitchell says that, on the banks of rivers, the tree is at its full value in 40 or 50 years; but that, in dry situations, it will require from 50 to 70 years to mature it. (*Dendrologia*, &c., p. 51.) In the *Dictionnaire des Eaux et Forêts*, it is stated, that a tree planted in a field, and surrounded by a fence at 25 ft. distance from it on every side, formed by its suckers, in 20 years, a circular clump of wood 50 ft. in diameter; and, consequently, that 30 or 40 trees would cover an acre with a thick wood in the same space of time. Hence it follows, that, when the tree is once introduced into woods, especially where the soil is loamy and moist, it forms a perpetual succession of young trees, however frequently these may be cut down. When treated as coppice-wood, the abele is by no means a durable plant; the stools decaying after they have borne three, or at most four, crops of poles.



1508

Geography. The common grey poplar (*P.* (a) canéscens) is generally supposed to be a native of Britain, as well as of France and Germany; but the abele tree (*P.* álba) is thought by some to have been first brought to England from Flanders. This we think highly probable; and it is favourable to our opinion that *P.* álba and its varieties ought to be considered as cultivated forms of *P.* canéscens. *P.* álba and *P.* (a.) canéscens are indigenous to Europe, as far north as 56° or 57°; and they are found throughout the south of Europe, Caucasus, Persia, and Barbary. They grow in most districts of Britain; and a few stunted plants of *P.* álba are said by M'Culloch to comprise all the trees in the Island of Lewis. Whether these trees in Lewis belong to *P.* álba, or *P.* (a.) canéscens, may, however, be doubted. Turner, in 1568, says, "the white aspe is plentifull in Germany and Italy;" but that he does not remember to have seen it in England. Gerard, who wrote 30 years after Turner, found the white poplar at Blackwall, near London; at Ovenden, in Essex; and a few other places. Dr. Walker, writing in 1773, says that it is doubtful whether the abele is a native of England; but that it certainly has the appearance of being indigenous in several parts of Scotland. But it must be recollected that, in his time, *P.* álba and *P.* (a.) canéscens were considered as synonymous. He adds, also, that the abele was planted in many places in Scotland about the end of the seventeenth century; and that it had been afterwards neglected and despised, in consequence of the great number of suckers that it threw up all round it from its creeping roots. Hartlib, in his *Compleat Husbandman* (published in 1659), states that, some years before the time of his writing, there were 10,000

abeles at once sent over into England from Flanders, and transplanted into many counties; and Mortimer, writing in the beginning of the eighteenth century, says that the best sorts of abele trees come from Holland and Flanders. Evelyn mentions the tree as being raised in abundance from cuttings, truncheons, and suckers; adding, that "there is a finer sort of white poplar, which the Dutch call abeel; and we have of late much of it transported out of Holland." The Dutch, he adds, "look upon a plantation of these trees as an ample portion for a daughter." (*Hunter's Evelyn*, vol. i. p. 209.)

History. The abele was known to the Romans, as we have already noticed when giving the history of the genus. As a road-side tree, it has been much planted, in modern times, in Holland, Flanders, and in some parts of France and Germany. In the forests of France, it is so abundant, in some places, as to form the prevailing tree over extensive tracts of country; and it furnishes fuel for the adjoining towns; more especially for bakers' ovens, those of Paris being almost entirely heated with the wood of this tree, which is there called *le bois blanc*. In Britain, the white poplar has been propagated in nurseries since the time of Miller; but it does not appear to have been ever very extensively planted in masses, though there are trees of it to be found here and there throughout the country. In Scotland, it was a popular tree about the beginning of the present century; more especially, as Sang informs us, for moist situations, which it was not thought advisable to drain. In such situations, however, though it will grow, it never attains a large size.

Properties and Uses. The wood of the white poplar weighs, when green, 58 lb. 3 oz. per cubic foot; and in a dried state, 38 lb. 7 oz.: it shrinks and cracks considerably in drying, losing one quarter of its bulk. The wood of *P.* (a.) canéscens is said to be much harder and more durable than that of *P.* álba; in the same manner as the wood of the *Tília* europæ'a parvifòlia is finer-grained and harder than that of *T.* e. grandifòlia. The wood is the whitest of any of the species; and it is used, in France and Germany, for a variety of minor purposes, particularly when lightness, either of weight or colour, is thought desirable; or where an artificial colour is to be given by staining. It is excellent for forming packing-cases, because nails may be driven into it without its splitting. It is used by the turner and the cabinet-maker, and a great many toys and small articles are made of it. The boards and rollers around which pieces of silk are wrapped in merchants' warehouses and in shops are made of this wood, which is peculiarly suitable for this purpose, from its lightness, which prevents it much increasing the expense of carriage. The principal use of the wood of the white poplar in Britain is for flooring-boards; but for this purpose it requires to be seasoned for two or three years before using. According to Mitchell, when felled at the point of maturity (see description above), abele wood is good for any kind of building purposes, especially on farms, where it is very suitable for the large folding doors for barns, as it is light, and never warps. It is also used as a substitute for the wood of the lime tree by musical instrument makers, and by carvers in wood. In Scotland, it is sometimes used in mill-work, and by the cabinet-maker and turner; and it is frequently used by the cooper, for making wooden dishes and casks. The leaves are eaten by cattle in Sweden, and are considered wholesome. As an ornamental tree, it is chiefly to be recommended in scenery on a large scale; since its great height and ample head overpower most artificial objects, such as buildings; and most exotic trees, from the comparative slowness of their growth. The fittest trees to plant along with the white poplar are other rapid-growing poplars and willows; and the fittest situations are the margins of broad rivers, or that of a large lake. In many situations in England, specimens of this tree exist, which, though fine in themselves, injure, by their disproportionate size, the effect of all the surrounding objects. Perhaps the most valuable purpose to which the tree can be applied in Britain, next to that of planting it by rivers and lakes, is for planting it in avenues, or by road sides: for the former, it is recommended on account of the rapidity of its growth; and for the latter, because its trunk is generally clear of branches to a considerable height, and,

consequently, the light and air are more freely admitted to the road, than when the road sides are planted with trees that branch to the ground, such as oaks, elms, or limes. On the Continent, the nakedness of the trunks of road-side trees is an objection rather than an advantage, on account of the superior dryness of the climate. In the *Nouveau Cours d'Agriculture*, it is recommended to substitute white poplars, in old elm or oak avenues, for any trees that may have died from accident or disease, on account of the rapidity of its growth, and the short time which will be requisite for it to attain an equal height with the elms or oaks remaining.

Poetical, mythological, and legendary Allusions. According to the ancient mythology, the white poplar was consecrated to Hercules, because he destroyed Cacus in a cavern adjoining Mount Aventinus, which was covered with these trees; and, in the moment of his triumph, bound his brows with a branch of white poplar (that being the only tree near him), as a token of his victory. When he descended into the infernal regions, he also returned with a wreath of white poplar round his head. (*Stackh. Comm. de Theophrast.*, p. 217.) It was this, says the fable, that made the abele leaves of the colour they are now. The perspiration from the hero's brow made the inner part of the leaf, which touched his forehead, white; while the thick smoke arising from some parts of the infernal regions turned the upper surface of the leaves almost black. Persons offering sacrifices to Hercules were always crowned with branches of this tree; and all who had gloriously conquered their enemies in battle wore garlands of it, in imitation of Hercules. The poets frequently mention the white poplar. Homer, when describing the shield of Ajax, son of Telamon, states that it was made by Tychius, a skilful currier of Hyle; and it is said that the Tychius thus immortalised was a real person, beneath the poplar tree at whose door Homer had often sat, reciting his poems, while the kind-hearted currier gave him food, and relieved his necessities. In another part of the *Iliad*, Homer compares the fall of Simoisius, when killed by Ajax, to that of a poplar: —

> " So falls a poplar, that in watery ground
> Raised high its head, with stately branches crown'd."

Ovid mentions that Paris had carved the name of Œnone on a poplar. Virgil, in his *Georgics*, gives directions for the culture of this tree, and mentions it in his *Eclogues*; and Horace, in his Ode to Dellius (lib. ii.), speaks of the white poplar as a tree which delights to grow on the banks of rivers. Modern poets have also noticed this tree. Cowper sings of—

> " The poplar, that with silver lines his leaf ;"

and Barry Cornwall says, —

> " The green woods moved, and the light poplar shook
> Its silver pyramid of leaves."

Sterne, in his *Sentimental Journey*, represents Maria as sitting under a poplar. In the *Sentiment of Flowers*, it is said that the ancients consecrated this tree to time, because the leaves are in continual agitation; and, being of a blackish green on one side, with a thick white cotton on the other, they were supposed to indicate the alternation of day and night.

Soil, Situation, Propagation, and Culture. For the abele to attain a large size, the soil in which it is planted should be loamy, and near water; though on a dry soil, where the tree will grow slower, the timber will be finer-grained, and more durable. In France, it is found to grow, not only in marshy places, but in dry sands; and it is a mistake to suppose that it will thrive in stagnant marshes in any climate. The French writers recommend it strongly for avenues, planted at a distance of 24 ft. tree from tree, on the side of a road from 60 ft. to 100 ft. wide; and, for filling up blanks in grown-up avenues, the white poplar is considered the best tree known. (See above; and *Dict. des Eaux et Forêts*, art. Avenue.) In British nurseries, it is commonly propagated by layers; which, as they seldom ripen the points of their shoots, or produce

abundance of fibrous roots the first season, ought to be transplanted into nursery lines for at least one year before removal to their final situation. The tree is admirably adapted for thickening or filling up blanks in woods and plantations; and, for this purpose, truncheons may be planted 3 in. or 4 in. in diameter, and 10 ft. or 12 ft. high. These truncheons have the great advantage of not being overshadowed by the adjoining trees, which is almost always the case when young plants are used for filling up vacancies among old trees. The truncheons need not be inserted very deeply in the soil, because the roots which they protrude, like those of all other trees having creeping roots, originate in a part of the trunk near the surface. When the white poplar is planted in masses, with a view to produce timber, the plants ought to be from 15 ft. to 18 ft. apart every way, and they may be most profitably cut down at the end of 30 or 40 years; but, when they are only to produce poles of from 6 in. to 9 in. in diameter, fit for roofing sheds and similar purposes, they need not be planted at a greater distance than from 6 ft. to 9 ft. every way; and, for coppice wood, from 4 ft. to 5 ft. is the proper distance. Owing to the softness of the wood, and its liability to shrink and crack, it is dangerous to cut off very large branches; and, even when branches of moderate size are cut off, the wound ought always to be covered over with grafting clay, or some description of plaster, to exclude the air. The tree is considered, both by French and English authors, as bearing lopping worse than any other species of the genus; and, when transplanted, the head should never be cut off, and not even cut in, unless the tree is to be planted in a hot and dry soil.

Accidents and Diseases. When the tree is either carelessly pruned, or when a branch is broken off by accident, or a stump suffered to decay, the water seldom fails to be conducted to the heart of the trunk, and, by bringing on caries, to rot the timber. The leaves, and also the trunk, of the tree are liable to be infested by fungi, of which several species are common to the different species of poplar. (See p. 1638.) The porosity of the trunk, stool, and roots is favourable to the production of fungi of the larger kinds; and the Polýporus igniàrius *Fries* may frequently be seen on the trunk of the tree, or on the stool of a tree that has been cut down, of gigantic size.

Statistics. Recorded Trees. At Strathfieldsaye, at Chalfont House, Bucks, and at Kingston, Surrey, Mitchell, writing in 1827, says, there are first-rate trees: at Longleat, he mentions some 100 ft. high, with trunks from 3 ft. to 4 ft. in diameter, and with 40 ft. to 60 ft. of clear bole. At Knowle, he saw one 9 ft. in circumference, that had been felled and cross cut: the sap-wood was about 4 in. thick, and the heart-wood spongy, like the inside of an overgrown turnip. At Wentworth House, Mitchell saw another overgrown abele, felled and sawn across, which presented the same appearance as the tree at Knowle. In Scotland, a tree at Drumlanrig, in Dumfriesshire, which stood on a dry soil, and was 80 years old, was, in 1773, 80 ft. high, with a trunk 2 ft. 6 in. in diameter. In the year 1769, a row of abeles, at Stevenston, in East Lothian, contained 122 trees, all about 80 ft. high, and having clear trunks of from 20 ft. to 30 ft. The trunks were from 5 ft. to 7 ft. in circumference, and yet the trees stood only 7 ft. distant from each other. They grew in a deep moist soil, were then 80 years old, and afforded a great quantity of timber, though they had begun to decay. (*Walker's Essays*, p. 50.) In France, in the years 1804 and 1805, several abeles, which were planted at Versailles in the time of Louis XIV., and had long been regarded as magnificent specimens, were cut down; and, though they had begun to decay, they were cut into planks, and sold at a high price, for naval purposes.

Pópulus álba in England. In the environs of London, at Ham House, it is 85 ft. high, with a trunk 3½ ft. in diameter. On the banks of the Thames, between Hampton Court and Chertsey, are several specimens upwards of 100 ft. high. In Devonshire, at Killerton, 25 years planted, it is 73 ft. high, diameter of trunk 2 ft. 1 in., and of the head 38 ft. In the Isle of Jersey, 10 years planted, it is 28 ft. high. In Surrey, at Deepdene, 10 years old, it is 27 ft. high, the diameter of the trunk 6 in., and of the head 10 ft. In Sussex, at Kidbrooke, it is 60 ft. high, diameter of the trunk 3 ft., and of the head 30 ft. In Wiltshire, at Longford Castle, it is 100 ft. high, the diameter of the trunk 6 ft., and of the head 90 ft. In Berkshire, at Bear Wood, 12 years planted, it is 40 ft. high; at Ditton Park, 90 years planted, it is 80 ft. high. In Denbighshire, at Llanbede Hall, 50 years planted, it is 63 ft. high. In Herefordshire, at Stoke Edith Park, it is 85 ft. high, the diameter of the trunk 4 ft., and of the head 60 ft. In Leicestershire, at Belvoir Castle, 26 years planted, it is 60 ft. high. In Northamptonshire, at Clumber Park, 14 years planted, it is 25 ft. high. In Northumberland, at Hartburn, 83 years planted, it is 82 ft. high. In Pembrokeshire, at Stackpole Court, 40 years planted, it is 80 ft. high, diameter of the trunk 2½ ft., and of the head 28 ft. In Shropshire, at Willey Park, 16 years planted, it is 30 ft. high. In Staffordshire, at Trentham, 26 years planted, it is 35 ft. high; at Alton Towers, 6 years planted, it is 20 ft. high. In Suffolk, at Finborough Hall, 80 years planted, it is 100 ft. high, the diameter of the trunk 6 ft., and of the head 75 ft. In Yorkshire, at Grimston, 14 years planted, it is 70 ft. high.

Pópulus álba in Scotland. In the environs of Edinburgh, at Hopetoun House, it is 30 ft. high; the diameter of the trunk 3 ft. 10 in., and of the head 30 ft. In Haddingtonshire, at Tynningham, it is 58 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 42 ft. In Roxburghshire, 70 years planted, it has a clean trunk 50 ft. in height, averaging for that height 2 ft. in diameter, and

containing nearly 120 ft. of timber. In Banffshire, at Gordon Castle, it is 70 ft. high, the diameter of the trunk 3 ft. In Clackmannanshire, in the garden of the Dollar Institution, 12 years planted, it is 50 ft. high. In Forfarshire, at Monboddo, 16 years planted, it is 25 ft. high; at Courtachy Castle, 14 years planted, it is 27 ft. high. In Perthshire, at Taymouth, it is 60 ft. high, the diameter of the trunk 3 ft., and of the head 25 ft.; in Messrs. Dickson and Turnbull's Nursery, 28 years planted, it is 54 ft. high.

Pópulus álba in Ireland. In the environs of Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 60 ft. high. In King's County, at Charleville Forest, 45 years planted, it is 120 ft. high; diameter of the trunk 2 ft. 10 in., and of the head 20 ft. In the County of Down, at Ballyleady, 10 years planted, it is 35 ft. high, diameter of the trunk 1½ ft., and of the head 33 ft. In Galway, at Coole, 70 years planted, it is 80 ft. high, the diameter of the trunk 2¼ ft.

Pópulus álba in Foreign Countries. In France, at Toulon, in the Botanic Garden, 30 years planted, it is 50 ft. high, the diameter of the trunk 2 ft.; at Avranches, in the Botanic Garden, 40 years planted, it is 60 ft. high, the diameter of the trunk 2½ ft., and of the head 40 ft. In Hanover, at Göttingen, in the Botanic Garden, 40 years planted, it is from 70 ft. to 80 ft. high, the diameter of the trunk from 2 ft. to 3 ft., and that of the head 50 ft. In Saxony, at Wörlitz, 60 years old, it is 50 ft. high, with a trunk 3½ ft. in diameter. In Bavaria, in the Botanic Garden, Munich, 24 years old, it is 30 ft. high, the diameter of the trunk 1 ft.; in the English Garden, 30 years planted, it is 50 ft. high. In Austria, at Vienna, at Laxenburg, 80 years old, it is 45 ft. high; at Kopenzel, 18 years planted, it is 20 ft. high; in the garden of Baron Loudon, 30 years planted, it is 36 ft. high; the diameter of the trunk 14 in., and of the head 16 ft.; at Brück on the Leytha, 60 years old, it is 90 ft. high, the diameter of the trunk 1½ ft., and of the head 60 ft. In Prussia, at Berlin, at Sans Souci, 50 years old, it is 60 ft. high, the diameter of the trunk 2¼ ft., and of the head 28 ft. In Italy, in Lombardy, at Monza, 30 years old, it is 70 ft. high, the diameter of the trunk 2 ft., and of the head 40 ft.

Commercial Statistics. Price of plants, in the London nurseries, 25*s.* per hundred, or, when of large size, 1*s.* each; at Bollwyller, 1 franc each.

♀ 3. *P.* TRE'MULA *L.* The trembling-*leaved* Poplar, *or Aspen.*

Identification. Lin. Sp. Pl., 1464.; Du Roi Harbk., 2. p. 148.; Willd. Arb., 228.; Sp. Pl., 4. p. 803.; Spreng. Syst. Veg., 2. p. 244.; Dill. Dict., No. 2.; Pall. Fl. Ross., 1. p. 65.; Smith Eng. Bot., t. 1909.; Engl. Fl., 4. p. 244.; Hook. Fl. Scot., 289.; Mackay Fl. Hibern., pt. 1. p. 254.; Du Ham. Arb., ed. nov., 2. p. 183.; Höss Anleit., p. 153.

Synonymes. *P.* No. 1633., *Hall. Hist.*, 2. 303.; *P.* líbyca *Raii Syn.* 456.; *P.* hýbrida *Dod. Pempt.*, 836., *Raii Syn.*, 446.; *P.* nìgra *Trag. Hist.*, 1033., fig.; *P.* péndula *Du Roi*; le Tremble, *Fr.*; la Tremola, Alberalla, Alberetto *Ital.*; Zitter-Pappel, Espe, *Ger.*

Derivation. The English name of Aspen is evidently derived from the German, *espe.*

The Sexes. Both sexes are described in the *English Flora.* A male plant was flowering in the London Horticultural Society's arboretum in the spring of 1835. The plant growing in the Cambridge Botanic Garden a few years ago, and perhaps still growing there, was a male one.

Engravings. Eng. Bot., t. 1909.; T. Nees ab Esenbeck Gen. Pl. Fl. Germ., fasc. 1., the catkins of the female, the flowers of both sexes, and the fruit; Blackw., t. 248.; Ger. Em., 1487. fig.; Lob. Ic., 2. 194. fig.; Bauh. Hist., 1. 163. fig.; Matth. Valgr., 1. 125. fig.; Cam. Epit., 67. fig.; Dod. Pempt. 836. fig.; Dalech. Hist., 87. fig.; Treg. Hist., 1083. fig.; Hayne Abbild, t. 203.; our *fig.* 1509.; and the plate in our last Volume.

Spec. Char., &c. Young branchlets hairy. Leaves having compressed footstalks, and disks that are roundish-ovate, or nearly orbicular; toothed in a repand manner, downy when young, afterwards glabrous on both surfaces. Stigmas 4, erect, eared at the base. (*Smith, Willd., Spreng.*) It is a native of rather moist woods, as well as of various other situations throughout Europe. (*Smith* in *Rees's Cyclop.*) It flowers in Britain in March and April.

Varieties. In our opinion, *P.* trépida, *P.* grandidentàta, and *P.* græ'ca are nothing more than different states of *P.* trémula; nevertheless, we have followed the authorities, and given them as species, inserting below only what are considered as varieties of *P.* trémula. Among the specimens sent by Professor Mertens to Sir J. E. Smith, before mentioned (see p. 1640.), the following approximate to P. trémula: —

- ♀ P. *t.* 1 *montícola*, *P.* montícola *Mertens.* — The professor seems to think this the genuine *P.* trémula of Linnæus. The specimen is of a male plant.
- ♀ P. *t.* 2 *parvifòlia* Mertens. — There are specimens of both sexes of this variety.
- ♀ P. *t.* 3 *grandifòlia* Mertens. — The specimen is of a female plant.
- ♀ P. *t.* 4 *rotundifòlia màjor* Mertens. — The specimen is of a male plant.
- ♀ P. *t.* 5 *mìnor* Mertens. — This specimen is of a male plant.
- ♀ P. *t.* 6 *oxyodónta*, *P.* oxyodónta *Mertens.* — The professor appears to doubt whether this is only a variety of *P.* trémula. Smith describes the teeth of the leaves of the species as nominally blunt: oxyodónta signifies sharp teeth; and in the specimen the teeth of the leaves are rather pointed. It is of a male plant.
- ♀ P. *t.* 7 *stricta*, *P.* strícta *Mertens.* — The professor appears doubtful

whether this is not also only a variety of *P.* trémula, though he has made it a species. The specimen is of a female.

The above varieties, we suppose, still exist on the ramparts of Bremen; cuttings of them might, no doubt, be procured through the Floetbeck Nursery.

♈ P. *t.* 8 *péndula*, *P.* péndula *Lodd. Cat.*, 1836, and the plate of this variety in our last Volume, is the only distinct variety of *P.* trémula that exists in the neighbourhood of London. The handsomest specimen is at Kenwood, where a male plant, 8 years planted, is 20 ft. high.

♈ P. *t.* 9 *supìna*, *P.* supìna *Lodd. Cat.*, ed. 1836, closely resembles the preceding sort; and the plant in the Hackney arboretum is so very small, that it is difficult to say whether it is really distinct or not.

♈ P. *t.* 10 *lævigàta*; *P.* lævigàta *Ait. Hort. Kew.*, *Lodd. Cat.*, ed. 1836; has shining leaves, rather larger than the species.

Description. A rapid-growing tree, rather exceeding the middle size, with a straight clean trunk, tall in proportion to its thickness; and a smooth bark, which becomes grey, and cracks with age. The branches, which extend horizontally, and are not very numerous, become pendulous as the tree advances in age. The young shoots are tough, pliant, and of a reddish colour; and both the wood and the leaves vary exceedingly, according to the dryness or moisture of the soil in which the tree is grown. The flowers appear in March, before those of any other poplar. The roots, Sir J. E. Smith observes, creep and emit suckers; and these, as well as the young branchlets, are clothed with brown prominent hairs: they are sometimes hoary, but not cottony. The colour of the upper surface of the leaves is a fine dark glaucous shining green, and that of the under surface of a paler shade. The disk of the leaf has a small point, and 3 ribs; it is somewhat wavy, and often shorter than the footstalk; which, being vertically compressed in its upper part in relation to the plane of the leaf, counteracts the ordinary waving motion of the leaf in the wind, and causes it to quiver with the slightest breeze; whence has arisen the proverbial theme of comparison, the trembling of an aspen leaf. (*Smith* in *Eng. Fl.*) The leaves, says Dr. Johnston of Berwick, are of a fine smooth dark green, with a narrow yellowish edge, more or less fringed with soft hairs, and suspended on flattened stalks; so that

1509



——— "When zephyrs wake,
The aspen's trembling leaves must shake:"

and, by their friction on one another, they make a constant rustling noise. (*Flora of Berwick upon Tweed*, vol. i. p. 220.) The tree, when in a suitable soil, grows with great rapidity during the first thirty years after being planted, attaining, in that time, the height of from 60 ft. to 80 ft.; afterwards, the trunk increases slowly in thickness, and in 60 or 80 years it begins to decay, and can seldom occupy the ground profitably for a longer period. When cut over by the surface, the stool sends up shoots more freely than the white poplar, but much less so than most other trees that stole. The want of shoots from the stools, however, is amply made up by the abundance of root suckers.

Geography, History, &c. The trembling poplar is a native of most parts of Britain, in wet soils. It is found as far north as Sutherland; at above 1600 ft. above the level of the sea, in Braemar, in Aberdeenshire; and, at an elevation of 1500 ft., in the Isle of Mull. It is indigenous to Ireland, in the county of Dublin, and in other places mentioned in Mackay's *Flora Hibernica*. It is found, according to Mirbel, in the whole of the south of Europe, Asia Minor, and Caucasus, and in Lapland to the Frozen Ocean. It is very abun-

dant in Russia, and particularly so in the woods about Moscow; and it is, perhaps, worthy of notice, that, in the year 1813, the year following the fire which burned down the greater part of that city, seedling plants of the trembling poplar sprang up every where among the ruins. The seeds had, doubtless, been wafted thither by the winds in the earlier part of the year 1812. Hence, had that city been deserted at that time, it would, in a very few years, have been one immense forest, the soil being every where rich. In Smith's *Prodromus of Sibthorp's Flora Græca*, the moist meadows of Bœotia, Mount Athos, and the neighbourhood of Constantinople, are given as localities where this tree is found. Among modern botanists, it appears to have been first recorded by Dodonæus, who adopts Pliny's name of Pópulus líbyca. It is mentioned by Gerard, Cook, Evelyn, Villars, and other authors, who all notice its property of not bearing lopping, which it has in common with *P.* álba, trépida, and græ`ca.

Properties and Uses. In a natural state, the bark of the trembling poplar forms the principal food of beavers, where the animal abounds; and deer, goats, and other quadrupeds of these kinds, are fonder of the spray and buds, than they are of those of any other tree. The young shoots and leaves, produced in the form of suckers from the roots, are greedily eaten by cattle and sheep. According to Withering, the roots, from their nearness to the surface, impoverish the land, and prevent anything else from growing on it luxuriantly; and the leaves, the same author observes, destroy the grass. Artificially considered, the uses of the trembling poplar, like that of all trees having a wide geographical range, are various. The wood of the trembling poplar weighs, when green, 54 lb. 6 oz.; half-dry, 40 lb. 8 oz.; and quite dry, 34 lb. 1 oz.: it consequently loses two fifths of its weight by drying. It shrinks by this operation one sixth part of its bulk, and cracks and splits in an extreme degree. The wood is white and tender: and it is employed by turners; by coopers, for herring casks, milk-pails, &c.; by sculptors and engravers; and by joiners and cabinet-makers; and for various minor uses, such as clogs, butcher's trays, pack-saddles, &c. In France, sabots are made of the wood, and also the bars and pins which serve to keep in their places the bottoms of casks; under-pinnings for flooring, laths, and rounds of ladders, and wooden vessels of different kinds If the tree is cut when the trunk is filled with sap, and employed green, the wood soon heats, and is quickly destroyed by fungi, under the appearance of mouldiness. The bark is employed in tanning, in common with that of *P.* álba and of *P.* nìgra. It may also be employed in buildings, in situations where it will be kept perfectly dry; but, when it is intended for that purpose, it ought to be cut down in the middle of winter, disbarked immediately, and deprived of its moisture by steaming and drying, or other means. As fuel, the wood is of feeble quality; and, though its flame is bright and clear, it gives but little heat, and the fires made of it are of short duration, the embers soon dying out. On account of the rapidity with which it gives out its heat, it is preferred for heating ovens and stoves. Its charcoal is light and soft, and it is employed in the fabrication of gunpowder. The value of the wood as fuel is to that of the beech as 970 is to 1540; and its charcoal is to that of the same tree as 988 is to 1600. A thousand pounds' weight of the ashes of the wood produces 61 lb. 4 oz. of potash; the tree, among a list of 73 plants, occupying only the 71st place. The leaves are employed, in France, Germany, and Sweden, as food for cattle, sheep, and goats, either in a green or dried state; and they are cut every two years for that purpose, during summer. Bosc thinks this the most valuable purpose to which the tree can be applied. Cattle, sheep, and goats, he says, are passionately fond of aspen leaves, when green; and like them very well when dry. The powdered bark, given in doses of half a pound each, expels the bots and worms from the stomachs of horses; and in Russia, Pallas informs us, the bark is used in domestic medicine, in scorbutic and other cases. In the Highlands of Scotland, and other places, the bark of young trees is made into torches. In landscape-gardening, the tree has a

very fine appearance, either when planted singly, or on the margins of woods; from its fine, round, and somewhat pendulous head, the beautiful glaucous green of its leaves, and, above all, by their perpetual trembling. The shade of all the poplars is considered more wholesome than that of any other tree; and that of this species is thought better than any of the others. The great drawback to the tree, when planted singly on lawns or pastures, or in hedgerows, is the number of suckers which it throws up; and which, if not eaten down by cattle, or mown, would soon turn a whole country into an aspen forest. Perhaps it might be grafted on *P. nigra*, which does not throw up suckers, or possibly on some kind of willow.

Poetical and legendary Allusions. The constant quivering of the aspen leaves has rendered the tree a favourite subject of allusion to the modern poets, and others, who have wished to find a comparison for anything in constant motion. One of the most curious superstitions respecting this tree is that of the Highlanders, who believe that the cross of Christ was made of it, and that, consequently, it can never rest. This, however, as Miss Kent observes, can hardly apply to the leaves, as the cross could not have been made of them; but perhaps, she adds, "they struggle to escape from the wicked wood on which they grow." (*Syl. Sketches*, p. 31.) Gerard compares the leaves to women's tongues, "which seldom cease wagging."

The following are some of the principal poetical allusions to the aspen: —

> ——— "His hand did quake
> And tremble like a leaf of aspen green."
>
> SPENSER.

> "A perfect calm; that not a breath
> Is heard to quiver through the closing woods,
> Or rustling turn the many-twinkling leaves
> Of aspen tall."
>
> THOMPSON.

Sir W. Scott has many allusions to this tree; particularly in the well-known lines, —

> "Oh, woman! in our hours of ease
> Uncertain, coy, and hard to please,
> And variable as the shade
> By the light quivering aspen made,
> When pain or sickness rends the brow,
> A ministering angel thou."

Soil, Situation, &c. As the roots of this tree chiefly extend close under the surface of the ground, it is not necessary that the soil should be deep; but, for the same reason, it ought to be loamy, rich rather than poor, and constantly moist. Hence, also, this tree is better adapted for soils that are constantly wet below, than almost any other tree, since its roots, by keeping so very near the surface, are never out of the reach of the air, which they would be if they penetrated into soil perpetually saturated with water. The conditions which this tree requires in respect to soil are found in moist woods, where the shade of the tree diminishes evaporation, and where the annual fall and decay of the leaves produce a constant supply of leaf-mould. The next most favourable situation is an open moist meadow, in which the tree, being freely exposed to the light and air on every side, attains its largest size, and assumes its finest form. In dry soils, the tree will live for many years, but never either attain a large size, or display its foliage to advantage. When planted in masses by itself, the trees may be placed at the distance from each other of 6 ft. or 8 ft. every way; and such a plantation, on a suitable soil, will have attained perfection in 50 or 60 years, and may be cut down as timber. After felling, the shoots seldom push vigorously; but the abundant suckers from the roots will produce a second crop of timber, if that should be considered advisable. Treated as a coppice-wood, it may be cut down every 7 or 8 years, for faggot-wood; and, for poles, every 15 or 20 years. When mixed with other trees in a timber plantation, the most suitable sorts to plant with it are said to be the oak and the beech.

Propagation, &c. The trembling poplar may be propagated by cuttings, but not so readily as most other species. Wherever trees are found, they generally throw up suckers from which plants may be selected; or cuttings of the roots may be made use of. In some situations, seedling trembling poplars are abundant in the woods; and these are sometimes collected by the country people, and sold to the nurserymen. When it is intended to raise the trembling poplar from seed artificially, the seeds ought to be gathered as soon as they drop, and immediately sown on light, rich, moist soil, and covered with the same soil as slightly as possible, and shaded by branches, spray, leaves, or mats. The plants will come up at the end of four or five weeks, and will grow 1 in. or 2 in. the first summer. In the future culture of the tree very little or no care is required, at least in Britain. On the Continent, and particularly in Belgium, it is very subject to the attacks of insects, and especially to those of the larvæ of different kinds of moths, butterflies, and *Tenthredínidæ*. These are collected in the beginning of summer, by order of the public authorities; and payments are made to the collectors in proportion to the quantity they bring in. The *Típula* junipérina *L.* lays its eggs in the leaves and leaf-stalks of this species; in consequence of which circumstance, red glandular substances, about the size of a pea, are produced: but the injury done by these is trifling, compared with that effected by other insects, which eat away the disk of the leaf.

Statistics. In England, in the environs of London, at Kenwood, Hampstead, *P.* t. péndula, 8 years planted, is 20 ft. high, in sandy soil; at Syon, the species, 70 ft. high; in the Isle of Jersey, in Saunders's Nursery, 10 years planted, it is 40 ft. high, the diameter of the trunk 14 in., and of the head 44 ft.; in Staffordshire, at Trentham, 10 years planted, it is 30 ft. high; in Yorkshire, at Castle Howard, it is 130 ft. high, the diameter of the trunk 3¼ ft. In Scotland, in Renfrewshire, at Bothwell Castle, 80 years planted, it is 73 ft. high, the diameter of the trunk is 4 ft., and of the head 117 ft.; in Banffshire, at Gordon Castle, 84 ft. high, the diameter of the trunk 4 ft., and that of the space covered by the branches 60 ft.; in Forfarshire, at Courtachy Castle, 14 years planted, it is 40 ft. high; in Perthshire, at Taymouth, it is 80 ft. high, diameter of the trunk 2 ft. 3 in., and of the head 20 ft.; in Stirlingshire, at Callendar Park, 10 years planted, it is 30 ft. high. In Ireland, in the Glasnevin Botanic Garden, 20 years planted, it is 30 ft. high; in Galway, at Coole, it is 70 ft. high, and the diameter of the trunk is 2 ft.; in Louth, at Oriel Temple, 40 years old, it is 72 ft. high. In Saxony, at Wörlitz, 60 years old, it is 40 ft. high, the diameter of the trunk 3 ft. In Austria, at Vienna, at Brück on the Leytha, 40 years old, it is 48 ft. high, the diameter of the trunk 2¼ ft., and of the head 36 ft. In Bavaria, at Munich, in the English Garden, 30 years old, it is 40 ft. high, the diameter of the trunk 10 in., and of the head 15 ft. In Russia, near St. Petersburg, 90 years old, it has a trunk 1 ft. in diameter. In Italy, in Lombardy, at Monza, 24 years old, it is 70 ft. high, the diameter of the trunk 1½ ft., and of the head 26 ft.

Commercial Statistics. Plants are seldom propagated in the London nurseries; but, when they are to be found there, the price is similar to that of *P.* álba; and this is the case also on the Continent.

♀ 4. *P.* (T.) TRE'PIDA *Willd.* The *North American* trembling-*leaved* Poplar, *or American Aspen.*

Identification. Willd. Sp. Pl., 4. p. 803.; Pursh Fl. Amer. Sept., 2. p. 618.; Spreng. Syst. Veg., 2. p. 244.

Synonyme. *P.* tremuloìdes *Michx. Fl. Bor. Amer.*, 2. p. 243., *Michx. North Amer. Sylva.*, 2. p. 241. t. 99. f. 1., *N. Du Ham.*, 2. p. 184.

The Sexes. A plant of the female is in the London Horticultural Society's arboretum, where it flowered in April, 1835, though only 5 ft. or 6 ft. high. The stigmas were 6 or 8.

Engravings. N. Du Ham., 2. t. 53.; Michx. Arb., 3. t. 8. f. 1.; Michx. North Amer. Sylva, 2. t. 99. f. 1.; and our *fig.* 1510.

Spec. Char., &c. Disk of leaf suborbiculate, except having an abruptly acuminate point, toothed, having two glands at its base on the upper surface, silky while young, afterwards glabrous. (*Pursh.*) Disk of leaf white, and silky on both surfaces when young; glabrous when adult. Petiole very long, not compressed. (*Willd.*, from dried specimens.) Bud resinous. Petiole compressed. Disk of leaf toothed with hooked teeth, ciliate. (*Spreng.*) Catkins silky. (*Michaux, jun.*) A tree, from 20 ft. to 30 ft. high; found in North America, in extensive swamps, from Canada to Carolina; and found, also, from Hudson's Bay to the northward of the Great Slave Lake, as far as lat. 64°. It was introduced into Britain in 1812, and flowers in April. Its usual period of leafing, in England, is before that of *P.* trémula. There is a plant of this kind in the London Horticultural Society's Garden, which, in 1834, after being eight years planted, was 12 ft. high. On April 20. 1835,

1510



shoots and leaves had been protruded from this plant, and been blackened by frost; while in P trémula and *P.* canadénsis the leaf buds were most of them unchanged from their appearance in winter. Michaux states that, in America, the American aspen blossoms about the 20th of April, and that the leaves appear in ten days or a fortnight afterwards. He describes the leaves as small when compared with those of other poplars, and as being thrown into agitation by the gentlest breath of air. The catkins are composed of silky plumes, which are pendulous, and protruded from the extremity of the shoots. The bracteas of the male flowers are of a dark chestnut colour, but are fringed with white hairs. The perianth is white. The anthers are numerous, and deep brown; the pollen is white The bark is smooth. The wood, according to Bigelow, is light, fine, soft, and perishable; and the bark is used as a febrifuge. In the United States, it is scarcely applied to any useful purpose; though Michaux was informed that it had been successfully divided into very thin laminæ, for the fabrication of women's hats; and that these hats were, for a short time, fashionable in several towns of the United States. Among the Cree Indians, the wood is esteemed to burn better, in a green state, than that of any other tree in the country. (*Franklin's first Journ.*, p. 753.) In Britain, this tree is in several collections, but is not very common: we believe it to be only a variety of the European *P.* trémula. Plants, in the London nurseries, are 2*s.* 6*d.* each; and at New York, 20 cents.

✝ 5. *P.* (T.) GRANDIDENTA'TA *Michx.* The large-toothed-*leaved* Poplar, *or North American large Aspen.*

Identification. Michx. Fl. Bor. Amer., 2. p. 243.; Michx. North Amer. Sylva, 2. p. 243. t. 99. f. 2.; Pursh Fl. Amer. Sept., 2. p. 619.; Spreng. Syst., 2. p. 244.
Engravings. Michx. North Amer. Sylva, 2. t. 99. f. 2.; and our *fig.* 1511.
The Sexes. The female is represented in Michaux's figure. The plants in the Horticultural Society's Garden have not yet flowered.

Spec. Char., &c. Leaf, when young, villous, afterwards glabrous on both surfaces; the petiole compressed in the terminal part; the disk roundish-ovate, acute, sinuately toothed with large unequal teeth. (*Pursh* and *Michx. sen.*) Wild in Canada, and a tree, 40 ft. or 50 ft. high, with a trunk 10 in. or 12 in. in diameter. The full-formed disk of the leaf is nearly round, and 2 in. or 3 in. in width. (*Michx. jun.*) *P.* grandidentàta is occasionally met with in the American woods, but is much less common than *P.* trépida. It is easily distinguished from the various cultivated kinds of poplar, by the large unequal indentations of the margins of the leaves. The leaves, as Michaux observes, are covered, when young, with a white down, which disappears as they grow older. In many instances, the disk is furnished with a pair of glands at the base. The catkins appear in May, and are 2 in. or 3 in. long. The wood is much like that of *P.* trépida. (*Bigelow's Account of "The Plants of Boston and its Vicinity in* 1824," p. 369, 370.) There are plants of this



1511

poplar in the Horticultural Society's Garden, which, in 1834, were 23 ft. high, after being ten years planted. The leaves are remarkable for their fine rich yellowish red tinge, when they first appear in spring; and for their large size, deep indentations, and fine glaucous green during summer: on which account, this poplar deserves a place in every collection as an ornamental tree. We consider it as a variety of *P.* trémula, from which it is not more distinct than *P.* álba *a*cerifòlia is from *P.* álba, or *T*ília europæ'a grandifòlia is from *T.* e. parvifòlia. Plants, in the London nurseries, are 2*s.* 6*d.* each; at Bollwyller, 3 francs; and at New York, 35 cents.

Variety.

♀ P. (*t.*) *g.* 2 *péndula* Michx. Flor. Bor. Amer. is said to have pendulous branches. There is a tree bearing this name in the Horticultural Society's Garden, but its branches are not pendulous.

♀ 6. *P.* GRÆ'CA *Ait.* The Grecian, *or Athenian*, Poplar.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 407., ed. 2., 5. p. 396.; Willd. Sp. Pl., 4. p. 804.; N. Du Ham., 2. p. 185.

The Sexes. The female is in the London Horticultural Society's arboretum; and was, some years ago, in gardens at Bury St. Edmunds, and in the plantations of O. R. Oakes, Esq., at Newton, near that town. *Willd.*, in his *Sp. Pl.*, also mentions the male as the only one that he had seen living. It is doubtful whether the male is in Britain.

Engravings. N. Du Ham., 2. t. 54.; our *fig.* 1512.; and the plate of this tree in our last Volume.

Spec. Char., &c. Branch round, glabrous. Petiole compressed. Disk of leaf roundish-ovate, having a shallow sinus at the base, and terminating in an acute point, serrated with equal teeth that are adpressed, glabrous, except being slightly ciliated on the edge. (*Willd. Sp. Pl.*) Wild in the islands of the Archipelago. (*Ibid.*) Cultivated in Britain in 1779, by Hugh Duke of Northumberland. It flowers in March and April. (*Hort. Kew.*) The species is not registered in Smith's *Prodromus of Sibthorp's Flora Græca;* so that, though named *P.* græ'ca, and the Athenian poplar, it does not appear to be wild in Greece; nor, notwithstanding the statement of Willdenow, in the Archipelago. According to the *Nouv. Du Hamel*, it is stated by some to be a native of North America, and more particularly of a township there named Athens. The circumstance of its having been introduced by Hugh Duke of Northumberland is favourable to this opinion; that nobleman having been a great importer of American trees. It is a handsome, vigorous-growing tree, very interesting when in flower, from its numerous



1512

darkish-coloured catkins, which have the plume-like character of those of *P.* trémula, *P.* trépida, and *P.* grandidentàta. The leaves, in their form, colour, and general aspect, resemble those of *P.* trépida, but are longer. The tissue of the bark of young trees is of a coarsish texture; which, by rendering its component parts obvious, makes it an eligible subject for study to young physiologists. The pith of the young branches, of about 1 in. in diameter, is very small in quantity, and green. The capsules are upon pedicels, and these and the rachis are hairy. It is propagated by layers, or by grafting on some other species of poplar; more particularly on *P.* álba canéscens. Bosc states that he has seen grafts produce shoots 8 ft. or 10 ft. long the first season. In the *Gardener's Magazine*, vol. iii. p. 410., is an account of a number of trees bearing the name of *P*ópulus græ'ca, which were planted at Woodfield, in Monmouthshire, which, after being planted ten years, averaged shoots of 3 ft. yearly. The writer had been induced to plant these trees by a paper on the subject, in the *Memoirs of the Literary Society of Manchester*, vol. v. Though differ-

ing more from *P.* trémula than either of the last three sorts described, still we are very much inclined to think that it is a variety of that species; though we do not feel sufficiently sure to venture to indicate this even in parentheses. The trees in the Horticultural Society's Garden were, in 1834, from 25 ft. to 30 ft. high, after being ten years planted. The *P.* græ'ca is very subject to the attacks of the poplar hawk moth (Smerínthus pópuli), the puss moth (Cerùra vínula), and sometimes to that of other less common *P*halæ'nidæ. (See *Mag. Nat. Hist.*, vol. v. p. 48.) Price of plants, in the London nurseries, 1*s.* each; and at Bollwyller, 1 franc.

Statistics. In England, in Surrey, at Bagshot Park, 16 years planted, it is 35 ft. high; in Durham, at Southend, 12 years planted, it is 35 ft. high; in Monmouthshire, at Woodfield, 10 years planted, it is 35 ft. high; in Rutlandshire, at Belvoir Castle, 18 years planted. it is 30 ft. high, the diameter of the trunk 8 in., and of the head 24 ft.; in Suffolk, in the Bury Botanic Garden, 12 years planted, it is 30 ft. high, the diameter of the trunk 9 in., and of the head 16 ft.; in Worcestershire, at Croome, 40 years planted, it is 60 ft. high. In Scotland, in Perthshire, in Messrs. Dickson and Turnbull's Nursery, Perth, 15 years planted, it is 20 ft. high. In Ireland, near Dublin, in the Glasnevin Botanic Garden, 20 years planted, it is 30 ft. high. In Saxony, at Wörlitz, 30 years old, it is 30 ft. high, the diameter of the trunk 1 ft. In Prussia, at Berlin, in the Botanic Garden, 10 years planted, it is 20 ft. high, the diameter of the trunk 6 in., and of the head 4 ft.

⚘ 7. *P.* NI'GRA *L.* The black-*barked, or common black*, Poplar.

Identification. Lin. Sp. Pl., 1464.; Pall. Fl. Ross., 1. p. 66.; Willd. Arb., 229.; Sp. Pl., 4. p. 804.; Spreng. Syst. Veg., 2. p. 244.; Ait. Hort. Kew., ed. 2. 5. p. 396.; Du Roi Harbk., 2. p. 139.; Raii Syn., 446.; Mill. Dict., No. 3.; Smith Eng. Bot., t. 1910.; Eng. Fl., 4. p. 245.: Hook. Fl. Scot., 289.; Mackay Fl. Hibern., pt. 1. p. 251.

Synonymes. *P.*, No. 1632., *Hall. Hist.*, 2. p. 302.; *P.* álba *Trag. Hist.*, 1080. fig.; *P.* vimínea *Du Ham. Arb.*; Aigeiros, *Greek*; Kabaki, *Modern Greek*; the old English Poplar, *Suffolk*; the Willow Poplar, *Cambridgeshire*; Water Poplar; the female of *P.* nigra is called the Cotton Tree at Bury St. Edmunds; Peuplier noir, Peuplier liard, Osier blanc, *Fr.*; schwarze Pappel, *Ger.*

The Sexes. Both are described in the *Eng. Flora.* Numerous male plants of *P.* nigra grow on the east confines of Bury St. Edmunds, beside the river Lark, of which that figured in Strutt's *Sylva* (our *fig.* 1514.) is one. In the male, Smith states that the stamens are "eight, rarely more with us, though Linnæus and Leers describe 16." A female plant of *P.* nigra stood, in 1829, on Hardwicke Heath, near Bury St. Edmunds, beside the pond; and it is said another female plant grows upon the same estate.

Engravings. Eng. Bot., t. 1910.; Ger. Em., 1486., fig.; and others, quoted in *Eng. Flora*; T. Nees ab Esenbeck Gen. Pl. Fl. Germ.; our *fig.* 1513.; and the plate of this species in our last Volume.

Spec. Char., &c. Petiole somewhat compressed. Disk of leaf deltoid, pointed, serrated with glanded teeth, glabrous on both surfaces. Catkins lax, cylindrical. Stigmas 4, simple, spreading. (*Smith* and *Sprengel.*) A tree, from 50 ft. to 80 ft. high; a native of Europe, from Sweden to Italy, on the banks of rivers, and in moist woods; and found, also, in the north of Africa; flowering in Britain in March and April.

Varieties.

⚘ P. *n.* 2 *víridis* Lindl.; *P.* víridis, *Lodd. Cat.*, ed. 1836; has the leaves of a brighter green than the species. It was brought into notice by a nurseryman of the name of Nurse, of Bealings, near Woodbridge, in Suffolk, about 1816, or before. There is a plant in the London Horticultural Society's Garden, and one in the Botanic Garden of Bury St. Edmunds, and it is propagated in several nurseries.

⚘ P. *n.* 3 *salicifòlia*; *P.* salicifòlia *Lodd. Cat.*, ed. 1836; has long narrow leaves, not unlike those of *S*àlix viminàlis. Introduced from the Floetbeck Nursery in 1834.

Description. A tree of the largest size, with an ample head, composed of numerous branches and terminal shoots. The bark is ash-coloured, and becomes rough and deeply furrowed with age. The roots, though they run along the surface, go deeper into the soil than those of either *P.* álba or *P.* trémula, and do not produce suckers, though the contrary is affirmed by Miller. The branches are whitish; and the branchlets are rarely hairy, but are more robust than those of *P.* monilífera, which are glabrous. The leaves are slightly notched on their edges, of a pale light green; and the petioles are yellowish. The leaves are protruded about the middle of May, much later than those of *P.* fastigiàta, *P.* álba, or *P.* (a.) canéscens; and, when they are first expanded, their colour appears a mixture of red and yellow. The catkins are shorter than those of *P.* trémula or *P.* álba; they appear before the leaves, in March and April; those of the males are of a dark red, and, being produced in


1513

abundance, have, as before observed (p. 1637.), a striking effect. The capsules of the female catkins are round; and the seeds which they enclose are enveloped in a beautiful white cotton. The seeds ripen in May, and are soon disseminated to a great distance by the winds. The tree is of rapid growth, especially in good soil, in moist situations, or on the banks of rivers. In the climate of London, it attains the height of 30 ft. or 40 ft. in ten years; and, when planted for timber, arrives at perfection in from forty to fifty years; beginning to decay when about sixty or eighty years old. It bears lopping; and, when treated as a pollard, it produces abundance of shoots. In moist soil, when cut down to the ground annually, it, throws up numerous shoots, like willows; and in that state, Bosc observes, it has been considered by some as a distinct species, and the name of *P.* vimínea applied to it.

Geography, History, &c. *P.* nìgra has nearly the same geographical range as *P.* álba; but it is rather less common in the colder parts of Europe than that tree. It appears to have been known to the ancients, being mentioned both by Theophrastus and Pliny. In modern times, it was first described by Bauhin. Gerard mentions it as growing as high as the white poplar, "and now and then higher." Till about the beginning of the present century, it was the poplar most extensively introduced into British plantations; but it has since given way, first to *P.* canadénsis, and, subsequently, to the black Italian poplar (*P.* monilífera). In the district of Waas, in Flanders, the whole of which is distributed into small enclosures, not more than an acre and a half in extent, great quantities of black and white poplars are planted in the hedgerows, 16 ft. or 18 ft. asunder. They are not suffered to grow to any size, but are cut down every twenty or twenty-four years, and replaced by young plants of the same sort. The largest trees are always cut down first, to prevent the land from being too much shaded. Fifty trees are allowed to an acre, and they are generally sold for seven or eight florins a piece, for making sabots, of which they not only send a prodigious quantity into other provinces, but also supply all Holland. (*Young's Annals*, as quoted in *Martyn's Mill.*)

Properties and Uses. In a natural state, the leaves and young shoots are eaten by cattle, and the wood by beavers. Artificially, the wood is applied to all the different purposes of that of *P.* álba. Its most general use, on the Continent, is for packing-cases, more especially for the transport of bottled wines. The wood is yellow, soft, and, being more fibrous than that of any other species of poplar, it splits more readily than the wood of either *P.* álba or *P.* trémula. It weighs, in a green state, 60 lb. 9 oz. per cubic foot; half-dry, 42 lb. 13 oz.; and dry, 29 lb.: thus losing more than one half its weight by drying; and it loses, by shrinking, more than a sixth of its bulk. It is more employed by joiners and cabinet-makers than the wood of *P.* trémula, because it is softer, and rather easier to work. The wood never splinters, and is incomparable, according to Evelyn, for all sorts of white wooden vessels, as trays, bowls, and other turner's ware. It is used for making clogs, and for the soles, as well as heels, of shoes. It is employed by the cartwright; and Vitruvius reckons it among the building timbers. Planted thick, and cut down for rafters, poles, and rails, few trees make a quicker return. It forms a very indifferent fuel, being in this respect to the beech as 792 is to 1540. The only European tree which is inferior to it as a fuel is the Lombardy poplar. The bark, in Russia, is used for preparing morocco leather; and, when it is pulverised, it is eaten by sheep. In Britain, it is used, like that of the oak, for tanning leather.

The bark of the old trunk, being very thick, light, and corky, is employed by fishermen to support their nets, and, it is said, is used as corks for bottles. The buds, macerated in boiling water, and afterwards bruised in a mortar and pressed, yield a fat substance, which burns like wax, and exhales a fine odour. The balsamic sap with which the buds are covered forms the basis of what Gerard calls that "profitable ointment, *unguentum populeum*, which is used as a soothing remedy against nervous diseases and hemeroides." The young shoots, especially when the plants are kept low, may be used as a substitute for those of the willow, in basket-making. When the tree is pollarded, and lopped every three or four years, it produces a great quantity of fuel, which can be used green. The shoots, with the leaves on, are formed into brooms. The cottony substance, or flock, which surrounds the seeds, has been used, in Germany and in France, as wadding; and it has also been manufactured into cloth, hats, and paper; but the expense of collecting it, and the want of length and elasticity in the fibre, occasioned the manufacture to be given up. In Kamtschatka, and in Norway, the inhabitants are sometimes under the necessity of drying the inner bark, and grinding it, in order to mix it with their oatmeal. (See *Laing's Norway*.) The flowers are much sought after by bees. In landscape-gardening, the tree is valuable for particular purposes, on account of the rapidity of its growth, the great bulk of its head, and the striking effect of its dark red flowers in early spring; but it is unfit for grounds which are not of considerable extent, unless when treated as a pollard or dwarf.

Poetical and mythological Allusions. According to Ovid, when Phaethon borrowed the chariot and horses of the sun, and by his heedless driving set half the world on fire, he was hurled from the chariot by Jupiter into the Po, where he was drowned; and his sisters, the Heliades, wandering on the banks of the river, were changed into trees; but, whether these trees were poplars or alders, the poets do not seem to be agreed. The evidence in favour of the poplar consists in there being abundance of black poplars on the banks of the Po; in the poplar, in common with many other aquatic trees, being so surcharged with moisture as to have it exude through the pores of the leaves, which may thus literally be said to weep; and in there being no tree on which the sun shines more brightly than on the black poplar, thus still showing gleams of parental affection to the only memorial left of the unhappy son whom his fondness had contributed to destroy.

> "And eke those trees, in whose transformed hue,
> The Sun's sad daughters wailed the rash decay
> Of Phaethon, whose limbs with lightnings rent,
> They gathering up, with sweet tears did lament." SPENSER.

The quivering of the leaves of the black poplar, and the manner in which the sun dances on their smooth surfaces, have made them afford to the poets joyous images, of activity and beauty. Homer, speaking of Penelope's handmaids, says :—

> "Some ply the loom; their busy fingers move
> Like poplar leaves when zephyr fans the grove." POPE'S *Odyssey*, book vii.

And a Spanish poet compares the tree to his lady's hair :—

> "Each wind that breathes, gallantly here and there
> Waves the fine gold of her disorder'd hair,
> As a green poplar leaf in wanton play
> Dances for joy at rosy break of day." WIFFEN'S *Garcilasso*.

Soil, Situation, &c. For the tree to attain a large size, the soil ought to be good, though it need not be deep; more especially if it be in the immediate vicinity of water. In such situations, the black poplar forms a very profitable pollard tree; and it is often so planted and treated in France and Italy, for the purpose of affording props for vines. It is readily propagated by cuttings or truncheons.

Insects, Diseases, &c. The black poplar is famous among naturalists for

producing a sort of galls, or protuberances, of various shapes and sizes, on its leaves and branches, which have been usually mistaken for the lodgments of worms hatched from the eggs of an ichneumon fly: but they are, in reality, produced from the operations of a viviparous species of A'phis (A. pópuli), for the bringing up of its offspring. These galls are of the bladder kind, being usually skinned over, and more or less hollow within, not woody, as those of the oak, &c. They proceed from different parts of the plant, some from the petioles of the leaves, and many from the young shoots: they are very various in figure, some being roundish, others oblong, others crooked and contorted in various directions, and some of them are in the figure of horns, like those of *Pistàcia Terebínthus* (p. 547.), and of the same origin. (*Rees's Cyclopædia.*) *Urèdo popùlina Pers.*, a kind of hypodermous fungus, has been found on the leaves of this species.

Statistics.—Recorded Trees. Evelyn mentions some stately and straight black poplars in Cheshire, that yielded boards and planks "by some preferred to oak for their whiteness and lasting, where they lie dry." At Alloa House, in Clackmannanshire, a tree, between 3 ft., and 4 ft. from the ground, girted 13 ft. or 14 ft.; and at Southfield, in Fife, one about twenty years old, in 1819, measured 7 ft. 1 in. in girt. (*Sang.*) A tree in the garden of Arquebuse, at Dijon, measured, in 1810, 21 ft. in circumference at 5 ft. from the ground. It had an ample head; and, though the trunk was ulcerated in several places, it appeared as if it would live for many years, though it was then of great age. The same tree, measured in 1836, by L. W. Dillwyn, Esq., exceeded 20 ft. in circumference, at 4 ft. from the ground.

Existing Trees. In England, in the environs of London, at Ham House, Essex, it is 74 ft. high, diameter of trunk 2 ft. 9 in., and of the head 58 ft.; in the grounds of Lambeth Palace, between 70 ft. and 80 ft. high, and in vigorous growth, though surrounded by smoke to such an extent as to injure most of the other trees in the garden. In the Isle of Wight, in Wilkins's Nursery, Newport, 10 years planted, it is 25 ft. high. In the Isle of Jersey, in Saunders's Nursery, 10 years planted, it is 20 ft. high, the diameter of the trunk 6 in., and that of the head 12 ft. In Wiltshire, at Wardour Castle, 50 years old, it is 70 ft. high, the diameter of the trunk 5 ft., and of the head 99 ft.; in Cheshire, at Kinmel Park, it is 60 ft. high, diameter of the trunk 4 ft., and of the head 45 ft.; in Herefordshire, at Eastnor Castle, 20 years planted, it is 60 ft. high; in Nottinghamshire, at Clumber Park, it is 78 ft. high; the diameter of the trunk 2 ft. 3 in., and of the head 39 ft.; in Pembrokeshire, at Stackpole Court, 30 years planted, it is 70 ft. high; in Radnorshire, at Maeslaugh Castle, 65 ft. high; the diameter of the trunk 4 ft., and of the head 76 ft.; in Suffolk, at Bury St. Edmunds, near the old bridge over the river Lark, is 90 ft. high, and the diameter of the trunk is 5 ft., "a noble and healthy tree" (see *fig.* 1514. to a scale of 50 ft. to 1 in., copied from Strutt's *Sylva*); in Worcestershire, at Hagley, 9 years planted, it is 23 ft. high. In Scotland, in Kirkcudbrightshire, at St. Mary's Isle, it is 75 ft. high, the diameter of the trunk 3½ ft., and of the head 40 ft.; in Haddingtonshire, at Tynningham, it is 62 ft. high, the diameter of the trunk 2½ ft., and of the head 27 ft.; in Ross-shire, at Brahan Castle, it is 24 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft. In Ireland, in the Glasnevin Botanic Garden, 35 years planted, it is 50 ft. high. In France, at Toulon, in the Botanic Garden, 30 years planted, it is 50 ft. high, with a trunk 2 ft. in diameter; at Avranches, in the Botanic Garden, 40 years planted, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 20 ft. In Austria, at Vienna, in the Laxenburg Garden, 40 years old, it is 30 ft. high; the diameter of the trunk 14 in., and of the head 12 ft. In Bavaria, at Munich, in the English Garden, 50 years old, it is 36 ft. high, the diameter of the trunk 2 ft., and the head 14 ft. In Sweden, at Lund, in the Botanic Garden, it is 72 ft. high, the diameter of the trunk 21 in., and of the head 12 ft. In Italy, in Lombardy, at Monza, 30 years old, it is 80 ft. high, the diameter of the trunk 2½ ft., and the diameter of head 40 ft.



1514

♀ 8. *P.* (N.) CANADE'NSIS *Michx.* The Canadian Poplar.

Identification. Michx. Arb., 3. p. 298.; N. Amer. Syl., 2. p. 227.
Synonymes. *P.* lævigàta *Willd. Sp. Pl.*, 4. p. 803., *Pursh Fl. Amer. Sept.*, 2. p. 619., *Spreng. Syst. Veg.*, 2. p. 244., but not of *Hort. Kew.*; *P.* monilífera *Hort. Par.*, *Nouv. Cours*, &c.; Cotton-wood, *Michx.*; Peuplier de Canada, *Fr.* in *Nouv. Cours d'Agri.*, edit. 1822, tom xi. p. 407.
The Sexes. Willdenow has noted that he had seen the male living; Bosc says that only the female is in France.
Engravings. Mich. Arb., 3. t. 11.; North Amer. Syl., 2. t. 95.; and our *fig.* 1515.

Spec. Char., &c. Young branch angled. Petiole compressed. Disk of leaf roundish ovate, deltoid, acuminate, subcordate at the base, where there are glands, serrated with unequal teeth, glabrous. (*Pursh.*) The branches are angular, and the angles form whitish lines, which persist even in the adult age of the tree. The trunk is furrowed, even in old age; less so than that of *P.* angulàta, more so than that of *P.* monilífera. The young buds are gummy. The catkins of the female are from 6 in. to 8 in. long. (*M. de Foucault*; and *Michx.* in *N. Amer. Syl.*) It is found wild in North America, in

high rocky places between Canada and Virginia, and about the western lakes; where it forms a tree from 70 ft. to 80 ft. high. (*Pursh.*) When introduced is uncertain; the *P.* lævigàta of Aiton, which is often confounded with this plant, and of which there are plants in the Horticultural Society's Garden and in Loddiges's arboretum, being a variety of *P.* trémula. It flowers in March and April. According to Michaux, the trunk of the Canadian poplar is furrowed, even in its old age, as well as on its young branches. It is remarkably hardy, growing in the Atlantic states, on the river Missouri, 1500 miles from its confluence with the Mississippi; while the Carolina poplar (*P.* angulàta), which is often confounded with it, is not found above 100 miles from the confluence of the two rivers; and its annual shoots are frozen, both there and in Europe, by a degree of cold that does not appear to have the least effect on those of *P.* canadénsis. In Britain, the Canadian poplar used to be very commonly propagated in nurseries, and extensively introduced into plantations; but, within the last 30 years, the black Italian poplar (*P.* monilífera) has been substituted for it. Bosc says that the Canadian poplar approaches nearer to *P.* nìgra than any other species, and that it is the best of all poplars for planting, where the production of timber, with a view to profit, is the object. This corresponds perfectly with the character of *P.* monilífera in this country, which we suppose to be an improved variety of *P.* canadénsis. The natural uses of the tree are the same as those of *P.* nìgra; the young shoots being given to horses, as their food, on the banks of the Missouri; and the branches being eaten by beavers. The Canadian poplar is propagated by cuttings of the young wood, about 18 in. long, put in during autumn. "It is remarkable," Bosc observes, "that the first shoots produced from these cuttings are always curved at the lower extremity; though in a few years this curvature entirely disappears. The same thing," he says, "takes place with the cuttings of *P.* monilífera." The fine poplar avenues in the lower parts of the gardens of Versailles are formed of this species.



1515

Statistics. In England, in the environs of London, at Mount Grove, Hampstead, 14 years planted, it is 30 ft. high; in Surrey, at Walton upon Thames, 42 years planted, it is 110 ft. high, the diameter of the trunk 3 ft. 8 in., and of the head 60 ft.; in Worcestershire, at Hadsor House, 22 years planted, it is 55 ft. high. In Scotland, near Edinburgh, at Gogar House, it is 100 ft. high, the diameter of the trunk 2 ft. 5 in., and of the head 30 ft. In Ireland, near Dublin, in the Cullenswood Nursery, 10 years planted, it is 50 ft. high; in Fermanagh, at Florence Court, 30 years planted, it is 70 ft. high. In Belgium, at Ghent, in the Botanic Garden, it is 100 ft. high. In Saxony, at Wörlitz, 60 years old, it is 60 ft. high, with a trunk 1½ ft. in diameter. In Bavaria, in the Botanic Garden, Munich, 81 years old, it is 60 ft. high, with a trunk 18 in. in diameter. In Austria, at Vienna, in the University Botanic Garden, 60 years old, it is 48 ft. high, the diameter of the trunk 17 in., and of the head 24 ft.; in Rosenthal's Nursery, 20 years planted, it is 53 ft. high, the diameter of the trunk 1½ ft., and of the head 22 ft.; at Brück on the Leytha, 40 years old, it is 70 ft. high, the diameter of the trunk 3 ft., and of the head 36 ft.

Commercial Statistics. Price of plants, in the London nurseries, 5*s.* per hundred; or single plants, of some height, 1*s.* each; at Bollwyller, 1½ franc each; at New York, 25 cents.

♀ 9. *P.* (N.) BETULIFO'LIA *Pursh.* The Birch-leaved Poplar.

Identification. Pursh Fl. Amer. Sept., 2. p. 619.; Spreng. Syst. Veg., 2. p. 244.
Synonymes. P. nìgra *Michx. Fl. Amer. Bor.*, 2. p. 244.; P. hudsónica *Michx. Arb.*, 3. p. 293. t. 10. f. 1., *North Amer. Syl.*, 2. p. 230.; *P.* hudsoniàna *Bosc*, and *Lodd. Cat.*, ed. 1836; American black Poplar, *Amer.*; Peuplier de la Baie d'Hudson, *Fr.*
The Sexes. It is uncertain whether it is the male or female plant that is in European collections.
Engravings. Michx. Arb., 3. t. 10. f. 1.; Michx. N. Amer. Syl., 2. t. 96. f. 1.; and our *fig.* 1516.

Spec. Char., &c. Young branches yellow. Branchlets hairy when young. Petioles yellow, and also hairy when young. Disk of leaf rhomboid, but much acuminated; toothed in every part of the edge; hairy on the under surface when young, but afterwards glabrous. (*Pursh.*) The catkins are 4 in. to 5 in. long, and destitute of the hairs which surround those of several other species. (*Michx. jun.*) A tree, growing to the height of 30 ft. or


1516

40 ft., with a trunk 12 in. or 15 in. in diameter; found by Michaux on the banks of the river Hudson, a little above Albany; and by Pursh about Lake Ontario. Judging from the plants in the collection of Messrs. Loddiges, and Michaux's figure, we have no doubt whatever of its being, like *P.* canadénsis, merely a variety of *P.* nìgra. It is, however, tolerably distinct; and, being a small, neat, deep-green-leaved tree, well deserves a place in collections.

Statistics. In England, in Devonshire, at Endsleigh Cottage, 16 years planted, it is 50 ft. high, the diameter of the trunk 14 in., and of the head 12 ft.; in Buckinghamshire, at Temple House, 40 years planted, it is 60 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft. Price of plants the same as in *P.* canadénsis.

♀ 10. *P.* MONILI'FERA *Ait.* The Necklace-bearing, *or black Italian,* Poplar.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 406.; Willd. Arb., 232., Sp. Pl., 4. p. 805.; Pursh Fl. Amer. Sept., 2. p. 618.; Wats. Dend. Brit., t. 102.

Synonymes. *P.* virginiàna *Lin.*, *Desf. Hort. Par.*, *Dum. Bot. Cult.*, tom. 6. p. 400., *Nouv. Cours d'Agri.*, tom. xi. p. 407.; *P.* glandulòsa *Mœnch Meth.*, p. 339.; *P.* carolinénsis *Mœnch Weissenst*, 81., *Burgsd. Anleit.*, 378.; *P.* nìgra itálica *Lodd. Cat.*, edit. 1836; *P.* nìgra americàna *Ibid.*; *P.* acladésca *Lindl.* in *Enc. of Plants*, p. 840.; ? *P.* marylándica *Bosc Nouv. Cours*, art. Peuplier, p. 409.; Virginian Poplar, Swiss Poplar, Canadian, or Berry-bearing, Poplar, *Mill.*; Peuplier Suisse, Peuplier triphilon (see *Nouv. Cours*), Peuplier de Virginie, *Dumont.*

Derivation. The epithet necklace-bearing alludes to the shape of the female catkins, which in their capsules, and the manner in which these are attached to the rachis, resemble strings of beads. Swiss poplar, and black Italian poplar, allude to the tree being very abundant in Switzerland and the north of Italy.

The Sexes. Both sexes are frequent in British collections, but the male is most abundant. Both are in the London Horticultural Society's Garden. The female is figured and described by Watson (see *Dend. Brit.*, t. 102.), who has figured some parts of the male flower in the same plate. Bosc remarks that only the male is cultivated in French gardens.

Engravings. Michx. Arb., t. 10. f. 2.; N. Amer. Syl., 2. t. 96. f. 2.; Wats. Dend. Brit., 2. t. 102.; our *fig.* 1517.; and the plates of this tree in our last Volume.

Spec. Char., &c. Shoot more or less angular. Branch round. Petiole slender, compressed in the upper part; in some leaves, shorter than the disk, in others longer. Disk deltoid, glanded at the base, which is subcordate in some leaves, and very obtusely wedge-shaped in others; tip acute; edge serrated all round, except in the central part of the base, and at the acute tip, the teeth have incurved points; glabrous, except in the edge, which, at least when the leaf is growing, is ciliate; edge ultimately, and perhaps early, gristly. Male flowers about 30. in a catkin, upon pedicels. Bractea glabrous. Stamens 16, a little longer than the corolla. Female flowers about 40 in a catkin. Stigmas 4, dilated, jagged. (*Pursh*, *Wats.*, *Michx.*, *Spreng.*, and obs.) It is rather doubtful to what country this poplar is indigenous: Canada is given as its native country in the *Hortus Kewensis*; but, in the *Nouveau Du Hamel*, it is stated to be a native of Virginia. Michaux, jun., states that neither he nor his father ever found it wild in America; and Pursh adds that he has only seen it in that country in gardens. According to the *Hortus Kewensis*, it was introduced into Britain by Dr. John Hope, in 1772. It is a tree, according to Pursh, from 60 ft. to 70 ft. high in America; but in Britain it grows to the height of 100 ft. or 120 ft., or upwards; flowering in March, and ripening its seeds about the middle of May.

Varieties.

- ♀ P. *m.* 2 *Lindleyàna Booth*; the new waved-leaved Poplar, *Hort.*; has rather larger leaves than the species, and they are somewhat more undulated. The plant in the London Horticultural Society's Garden is 13 ft. high.
- ♀ P. *m.* 3 *fòliis variegàtis* Hort. — The tree in the Horticultural Society's Garden is between 30 ft. and 40 ft. high; but its variegation is by no means conspicuous, except in early spring.

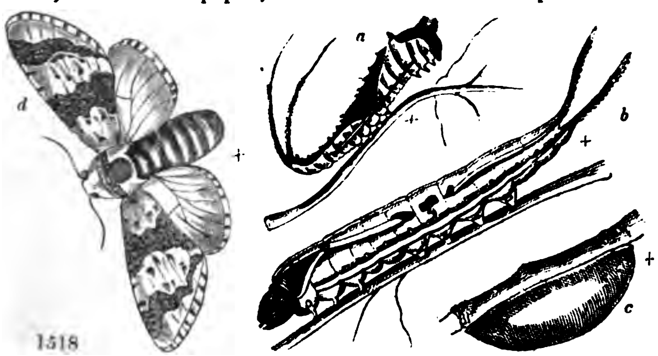
Description, &c. *P.* monilífera is the most rapid-growing of all the poplars; and its timber is equal, if not superior, in quality to that of any other species.

1517



It comes into leaf, in the climate of London, in the last week of April, or in the beginning of May; about which time the male catkins have chiefly dropped off. The cottony seed is ripe about the middle of May, and is so abundant, even in young trees, as to cover the ground under them like a fall of snow. When young, the tree shoots up with a strong erect stem, which is much less liable to put out timber-like branches than any other poplar whatever, except *P.* fastigiàta and *P.* balsamífera. The rate of growth, in the climate of London, on good soil, is between 30 ft. and 40 ft. in 7 years; and even in Scotland it has attained the height of 70 ft. in 16 years. There appears to be little doubt of its being a native of America; but, as Pursh has only seen it in gardens there, and neither Michaux nor his father had ever seen it there at all, we think it probably only a cultivated variety of *P.* canadénsis; which, as we have before observed, comes so near the *P.* nìgra of Britain, as to induce us to think that they are not specifically different. *P.* monilífera was introduced into England in 1772, from Canada; but, as it is figured in Abbott and Smith's *Natural History of Georgia*, vol. ii. t. 71., it appears to be also a native of that country. After its first introduction, it does not appear to have been much cultivated for some years, when it was brought into notice by Messrs. Archibald Dickson and Co., of Hasendeanburn Nursery, under the name of the black Italian poplar. Its history under this name is thus given in Pontey's *Profitable Planter:* — Messrs. Dickson obtained the plant from a gentleman in their neighbourhood, who had received it from his son, then residing in North America. Mr. Archibald Dickson then travelled for the firm through most of the northern districts of England; and, having a high opinion of this poplar, of which he had been the first to procure a stock of plants, he recommended it every where. The name of the black Italian poplar he accounted for to Mr. Pontey, by saying that he had learned that this sort of poplar was common in Italy, as well as in America. Mr. Pontey adds, in confirmation of Mr. Dickson's statement: " As I can now recollect his having so recommended the article, and also having bought our first stock from him, in or about the year 1787, I have, therefore, good reason to suppose his account is in every respect accurate: indeed, it stands strongly confirmed by the age of the trees found on the southern verge, and within his route, as they are much older than those to the south of it; and, therefore, I think Messrs. Dickson entitled to the credit of having first recommended and disseminated a tree, the rapid growth of which, in addition to its being highly ornamental, will prove of essential benefit to the country." (*Pontey's Prof. Planter*, p. 218.) This was written in 1813, when Mr. Pontey published the first edition of his book; and the black Italian poplar has, since that period, been far more extensively planted in Britain than any other species or variety of the genus. Notwithstanding this evidence in favour of its being a native of North America, we think (as we believe all the white-barked poplars, such as *P.* nìgra, *P.* canadénsis, *P. b*etulæfòlia, *P.* fastigiàta, and *P.* angulàta, to be different forms of one species) that *P.* monilífera may have been originated in Italy or Switzerland, and carried out to North America; and, if so, this will readily account for the English name of black Italian, the American name, mentioned by Michaux and Browne, of Swiss poplar, and the French name of Peuplier Suisse. We have heard of a plant of *P.* fastigiàta, which appears to be throwing out a side branch of *P.* monilífera; but we are not authorised at present to state any particulars respecting it. The female catkins of the two kinds appear so much alike, as to leave no doubt in our minds of their identity as species.

Properties and Uses, Soil, Propagation, &c. The wood may be applied to the same purposes as that of the species previously described; but, being of larger dimensions, it may be considered as better fitted for being used in buildings. Pontey observes that the tree is not only an astonishingly quick grower, but that its stem is remarkably straight; and that, with very trifling attention to side pruning, it may be kept clear of branches to any required height. For these reasons, he considers it the most profitable of all trees to plant in masses in a fertile soil, rather moist. Sir J. E. Smith describes the tree as very hardy in Britain, and valuable for planting in exposed situations, or on poor sandy soil; but he adds that the female tree is objectionable, the down of the seeds being a great nuisance, particularly near houses; as it sticks to clothes and furniture in a most troublesome manner. Hence, the male trees should be selected, not only for planting near a house, but wherever ornament is the main object; as the flowers, which are of a deep red, and produced in great abundance, are as ornamental as those of *P.* nìgra; while the female flowers of both species are comparatively inconspicuous, and the seeds alike cottony and troublesome. Were every cottager to grow his own fuel, there is, perhaps, no tree that would succeed so well for that purpose, on a small spot of ground, as *P.* monilífera. (See *Gard. Mag.*, vol. vi. p. 146.) Cuttings of the black Italian poplar root more freely than those of the Canadian poplar; and this, indeed, constitutes, in our opinion, one of the most important differences between the two trees. The caterpillars of one of the bombycideous moths, belonging to the genus Cerùra, and regarded (correctly?) by Sir J. E. Smith as identical with the English C. fúrcula, the kitten moth, (*Abb. and Smith, Ins. of Georgia*, t. 71., and our *fig.* 1518.) feed on this poplar, both in America and Europe. The cater-



1518

pillar (*a*), which is green and brown, when disturbed, shoots out of the end of its forked tail two soft orange-coloured threads. Early in August, having become much larger (*b*), it sheds its skin, and turns green striped with white. In a few days, it encloses itself in a case made of chips of the wood (*c*), which it attaches to a branch, and which looks somewhat like a slug, out of which the moth (*d*) makes its escape at one end.

Statistics. Recorded Trees. Mr. Pontey, in 1813, measured a tree growing in the garden of Mr. Richard Atkinson of Huddersfield, which had been then planted 25 years, and found it 60 ft. high, and containing 46 cubic feet of good timber. The soil was light, and only about 1 ft. deep, on a subsoil of coarse gravel. Mr. Pontey also measured another tree at Huddersfield, planted by himself in very wet soil, 19 years before, which was 64 ft. high, and contained 34 ft. of timber. (*Forest Pruner*, 4th edit., p. 219.) Bosc, in 1822, mentions a superb avenue of these trees in the Jardin des Plantes; but they have since been cut down.

Existing Trees. In England, at Syon, it is 102 ft. high, diameter of the trunk 4 ft. 5 in., and of the head 95 ft.; at Ham House, Essex, it is 100 ft. high, diameter of the trunk 3 ft. 8 in., and of the head 68 ft.; at York House, Twickenham, 60 years old, it is 80 ft. high, diameter of the trunk 18 in., and of the head 40 ft.; in Devonshire, at Bystock Park, 12 years planted, it is 40 ft. high; in Dorsetshire, at Melbury Park, 23 years planted, it is 66 ft. high, diameter of the trunk 7 in., and of the head 26 ft.; in Hampshire, at Strathfieldsaye, it is 108 ft. high, with a trunk 5 ft. in diameter; in Somersetshire, at Nettlecombe, 13 years planted, it is 54 ft. high, the diameter of the trunk 1 ft. 7 in., and of the head 21 ft.; in Surrey, at Bagshot Park, 22 years old, it is 35 ft. high, in Cheshire, at Eaton Hall, 17 years planted, it is 50 ft. high; in Denbighshire, at Llanbede Hall, 20 years planted, it is 55 ft. high; in Lancashire, at Latham House, 28 years planted, it is 77 ft. high, the diameter

of the trunk 3 ft., and of the head 57 ft.; in Monmouthshire, at Dowlais House, 10 years planted, it is 20 ft. high; in Worcestershire, at Croome, 25 years planted, is 90 ft. high, the diameter of the trunk 20 in., and of the head 20 ft. In Scotland, in the Experimental Garden, Inverleith, 9 years planted, it is 23 ft. high; in Berwickshire, at the Hirsel, 13 years planted, it is 44 ft. high; in Lanarkshire, in the Glasgow Botanic Garden, 16 years planted, it is 60 ft. high; in Roxburghshire, near Hawick, one tree, 59 years planted, has a clear trunk of 55 ft., which girts 6 ft. 2 in., and contains 130 ft. of timber; another tree, 63 years planted, has a clear trunk of 55 ft., with a main girt of 6 ft. 11 in., and contains 164 ft. of timber; in Argyllshire, at Toward Castle, 15 years planted, it is 36 ft. high; in Clackmannanshire, in the garden of the Dollar Institution, 12 years planted, it is 40 ft. high; in Perthshire, in Dickson and Turnbull's Nursery, 65 years planted, it is 73 ft. high, diameter of the trunk 2½ ft., and of the head 42 ft. In Ireland, in the Glasnevin Botanic Garden, 5 years planted, it is 16 ft. high. In Austria, at Vienna, in Rosenthal's Nursery, 16 years old, it is 33 ft. high, the diameter of the trunk 1 ft., and of the head 27 ft. In Bavaria, at Munich, in the English Garden, 30 years planted, it is 50 ft. high, the diameter of the trunk 20 in., and of the head 15 ft.

♀ 11. *P.* FASTIGIA'TA. The fastigiate, *or Lombardy*, Poplar.

Identification. Desf. Hist. Arb., t. 2. p. 465.

Synonymes. *P.* dilatàta *Ait. Hort. Kew.*, ed. 1., 3. p. 406., ed. 2., 5. p. 396., *Willd. Arb.*, 229., *Sp. Pl.*, 4. p. 804., *Spreng. Syst. Veg.*, 2. p. 244.; *P.* nìgra itálica *Du Roi Harbk.*, 2. p. 141.; *P.* itálica *Mœnch Weissenst.*, 79.; *P.* itálica dilatàta *Willd.*; *P.* pyramidàta *Hort.*; *P.* pannónica *Jacq.*; *P.* itálica var. carolinénsis *Burgsdorf*; Cypress Poplar, Turin Poplar, Po Poplar; Peuplier d'Italie, Peuplier pyramidal, *Fr.*; Lombardische Pappel, Italianische Pappel, *Ger.*; Pioppo Cypresso, *Ital.*

The Sexes. Plants of the male are plentiful in England. The female is known to be extant in Lombardy, whence we have received dried specimens and seeds in November, 1836. (See *Gard. Mag.*, vol. xii.) M. C. A. Fischer, inspector of the University Botanic Garden, Göttingen, found, in 1827, a single plant of the female, after having many years before sought fruitlessly for it, among many thousands of plants around Göttingen. (See *Gard. Mag.*, vol. vi. p. 419, 420.)

Engravings. Jaume St. Hilaire; our *figs.* 1519, 1520.; and the plates in our last Volume. In *fig.* 1520., *a* represents the female catkins with the blossoms expanded; *b*, the female catkins with seeds ripe; *c*, a portion of the female catkin of the natural size; *d*, a single flower of the natural size; and *e*, a single flower magnified.

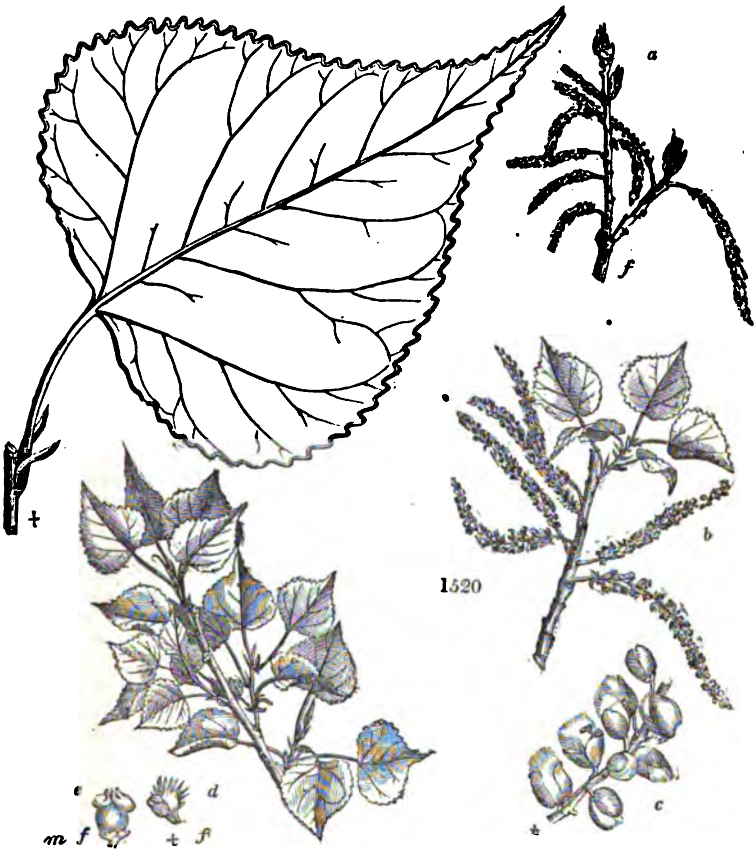
Spec. Char., &c. A very distinct kind, having the form of the cypress tree, from its branches being gathered together about the stem. (*Willd.*) Petiole compressed. Disk of leaf deltoid, wider than long, crenulated in the whole of the edge, even the base; glabrous upon both surfaces. (*Ait. Hort. Kew.*, and *Spreng.*) Leaves in the bud involutely folded. A tree, growing to the height of from 100 ft. to 120 ft., and sometimes to 150 ft. Introduced from Italy into Britain about 1758, and flowering in March and April. (*Ait. Hort. Kew.*)

Description, &c. The Lombardy poplar is readily distinguished from all other trees of this genus by its tall narrow form, and by the total absence of horizontal branches. The trunk is twisted, and deeply furrowed; and the wood, which is small in quantity in proportion to the height of the tree, is of little worth or duration, being seldom of such dimensions as to admit of its being sawn up into boards of a useful width. The leaves are very similar to those of *P.* nìgra, and the female catkins to those of *P.* monilífera; the male catkins resemble those of *P.* nìgra, and have red anthers, but are considerably more slender. One difference between *P.* fastigiàta and *P.* nìgra is, that the former produces suckers, though not in any great abundance; while the latter rarely produces any. *P.* fastigiàta, also, in the climate of London, protrudes its leaves eight or ten days sooner than *P.* nìgra. The male catkins of *P.* fastigiàta, wetted and laid upon paper, stain it of a deep green. The rate of growth of *P.* fastigiàta, when planted in a loamy soil, near water, is very rapid. In the village of Great Tew, in Oxfordshire, a tree, planted by a man who, in 1835, was still living in a cottage near it, was 125 ft. high, having been planted about 50 years. The Lombardy poplar is but of short duration; for, though a tree from one of the original cuttings brought home by Lord Rochford still exists in a vigorous state at Purser's Cross, yet the trees at Blenheim, and other places, planted about the same time, or a few years afterwards, are in a state of decay.

1519



Geography, History, &c. The Lombardy poplar is considered, by Signor Manetti and others, as wild in Italy, particularly in Lombardy, on the banks of the Po; because it has been observed that, when that river overflows its



banks, and carries off part of the surface soil, so as to expose that which has lain covered for many years, " a great quantity of black poplars always spring up; and among them are many of the cypress, or Lombardy, poplars." (*Gard. Mag.*, vol. xii. p. 569.) Signor Manetti, from whom we quote, adds: " These seeds have lain buried in the soil for many years, and were, no doubt, produced by the forests which once covered the banks of the Po, the remains of which are still to be found in many places." (*Ibid.*) To us it appears not improbable, that the plants alluded to may have sprung up from seeds distributed by the winds the same season, as the fresh soil would form a very favourable nidus for their reception. The Lombardy, or cypress, poplar is said to be also a native of Persia and the Himalayas, and to have been mentioned by Avicenna. Morier found it abundant in Persia; of which country Bosc and some other botanists consider it a native, and thence to have been introduced into Italy. The first avenue of Lombardy poplars planted there, Bosc observes, was between Milan and Pavia; and the date of this avenue could, doubtless, be obtained from the municipal documents of either or both of these cities. It is singular, that the Lombardy poplar was not introduced into Tuscany till 1805; a circumstance which appears to us strongly in favour of the supposition of its not being indigenous to Lombardy, or any part of Italy. So remarkable a tree could not have escaped the notice of the Roman agricultural writers; and would, undoubtedly, have been recorded by Pliny, if it had been known in Europe in his day. Into France it was introduced in

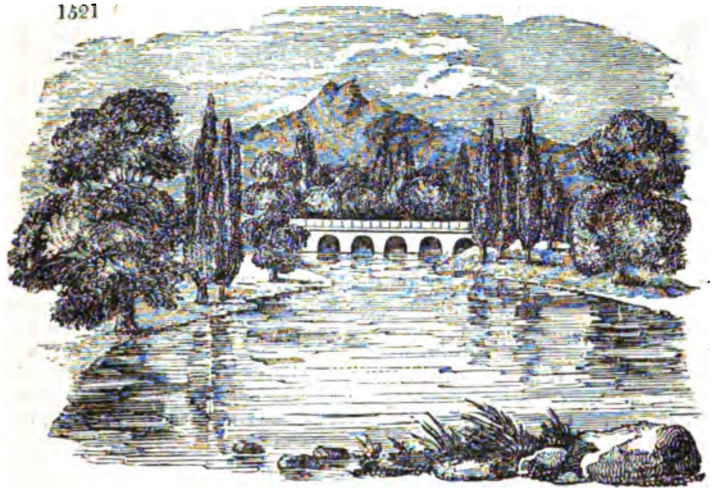
1749; and, judging from the trees between Carlsruhe and Durlach, it must have found its way about the same time into Germany. The first trees imported into France were planted on the banks of the canal of Montargis; and the first avenue formed in Germany was that between Carlsruhe and Durlach, described in p. 147. Extensive avenues of this tree have since been planted in France, Belgium, and Germany. Every traveller in Prussia must have observed those in the neighbourhood of Berlin. According to the *Hortus Kewensis*, it was introduced into England about 1758, by the Earl of Rochford, from Turin, where he was ambassador; and he planted it at St. Osyth's, in Essex, in which county this poplar is said still to go by his name. Dr. Walker states that cuttings of the Lombardy poplar were first brought to London by the Earl of Hertford, in the year 1763; and, according to others, the plant was first imported as part of the package of some statuary, sent to Whitton, for the Duke of Argyll, who began to plant in 1720, and died in 1761. (See p. 57.) Cuttings from the trees raised by Lord Hertford were sent to New Posso, in Tweeddale, in 1765; and the tree was also extensively distributed in Scotland, some years afterwards, by Lord Gardenstone, who brought the cuttings direct from Italy (See his *Travelling Memorandums.*) The tree has since been generally planted throughout Europe, chiefly as an avenue, or roadside, tree; or as an ornamental tree among houses in towns; but in part, also, for its timber.

Properties and Uses. The wood, according to Manetti, is inferior to that of *P.* nìgra; but it will do very well for packing-cases. The branches, he adds, are of very little use either for fuel or vine-props; and, in consequence, its culture as a useful tree in Lombardy is now very generally abandoned in favour of that of *P.* nìgra. (*Gard. Mag.*, vol. xii. p. 570.) When Arthur Young travelled in Italy, he found that the Lombardy poplar grew to the height of 40 ft. in 8 years; and that in 12 years it was fit to cut down for building purposes. Rafters, small beams, studs, boards, &c., brushed over with coal tar and brick-dust, laid on hot, have stood sixteen years without the least decay. In twenty years, he says, the tree will produce a trunk 2 ft. in diameter, which, being cut down, is sawn green into thin boards, ½ in. or a ¼ in. in thickness, for packing-cases, and similar uses. All the vessels in which grapes were carried home from the vineyards were formerly made of Lombardy poplar planks, about 2 in. thick; but they are now formed of the wood of *P.* nìgra. Such vessels last 30 or 40 years; and, in consequence of their lightness, are manageable, however large and long they may be. A 4-wheeled cart is, in general, covered with one of them; and it contains about 15 cwt. of grapes. In France, both the Lombardy and black Italian poplars are formed into fences by being planted when the plants are about 6 ft. high, in lines 6 in. apart. The stems are connected by a horizontal rod, about 3 ft. from the ground; and a fence is thus produced the first season. After the trees composing the fence have grown five or six years, they are cut down, and afford a very considerable bulk of timber, fit for slight agricultural buildings, fencing, and fuel. In some cases, the trees, instead of being cut down, are thinned, and those that remain are suffered to attain a timber-like size, not being cut down till the expiration of eighteen or twenty years; but this mode is only followed when the fields enclosed are of such a size as not to be injured by the shade of the trees.

In Britain, the great use of the Lombardy poplar is as a tree for planting among houses, and where it is required to form a contrast with round-headed trees in ornamental plantations. It is admirably adapted for planting in streets, and among houses in towns and villages; from the little space occupied by its branches, which are compressed about the trunk, so as not to interfere with the walls, nor to obstruct the access of light to the windows. The next best poplars for this purpose are the balsam and Ontario poplars; and the observations which we are about to quote in favour of the use of the Lombardy poplar in scenery will also apply, in some degree, to these two species. The employment of the Lombardy poplar for contrasting with

round-headed trees has been illustrated by Mr. John Thompson, in the first volume of the *Gardener's Magazine;* of which paper the following is an abstract, with some explanatory additions:—The Lombardy poplar, considered as a tall conical mass of foliage, becomes of great importance in scenery, when contrasted with round-headed trees. It is a known rule in the composition of landscape, that all horizontal lines should be balanced and supported by perpendicular ones; and, hence, the bridge in *fig.* 1521., displaying a long and

1521



conspicuous horizontal line, has its effect greatly increased by the poplars planted on each side of it. Not only the lines of the bridge are balanced and supported by the upright poplars, but lengthened and pleasing reflections from the water are produced; which, breaking the horizontal gleams of light, not only produce variety and richness, but, by increasing the length of the perpendicular lines formed by the poplars, confer a degree of sublimity on the picture: since it is allowed by all writers on the material sublime, from Burke to Dugald Stewart, that gradually tapering objects of great height create the emotion of sublimity. This is admirably illustrated at Blenheim, where the poplar is an accompaniment to all the bridges, but more particularly to that viaduct, near Woodstock, where the water first enters the park: this, seen from the neighbourhood of the great bridge, forms a landscape of much beauty and purity. On the other hand, the planting of the island in the lake at Blenheim is as much at variance with good taste as the planting at the bridge is conformable to it. It is covered with tall poplars, forming a mass which seems too big for its base; and which, from its stiff and upright form, is too strongly opposed to the varied outline of the surrounding wood and water, and destroys all breadth of effect. How much more agreeable it would have been, to have looked down from the bridge on an island varied with small groups of well-selected, low, round-headed trees! Lombardy poplars may be advantageously planted wherever there is a continuance of horizontal lines; but they should be so arranged as to form a part of those lines, and to seem to grow out of them, rather than to break or oppose them in too abrupt a manner. In the case of a stable or other agricultural building, where the principal mass extends in length, rather than in height, it would be wrong to plant Lombardy poplars, or other tall fastigiate trees, immediately before the building; but they will have a good effect when placed at the sides, or behind it, as shown in *fig.* 1522. This poplar is very generally planted in front of the suburban cottages and residences which are to be found within a few

1522



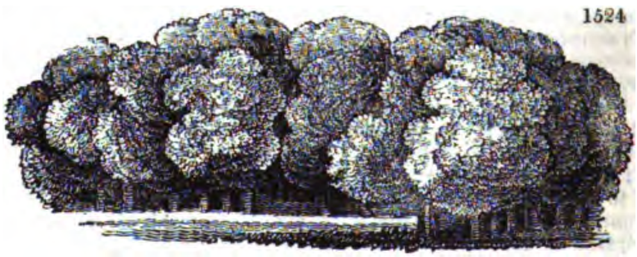
miles from the metropolis; six or eight poplars, taller than the house, often obstructing its view, and overpowering and diminishing it by their magnitude and stiffness; while a few low trees, such as thorns and laburnums, mixed with lilacs and other shrubs, would have formed subordinate groups and masses to the house, and served to increase its effect in the landscape. This poplar, or some equally fastigiate tree, should appear in all plantations and belts that are made with a view to picturesque effect; as in *fig.* 1523., where

1523



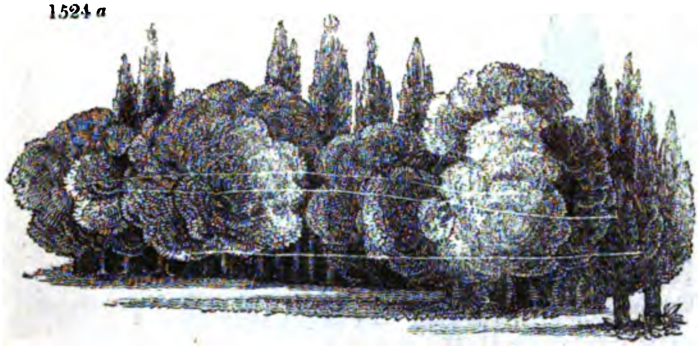
the outline is varied as well as the face of the plantation. Masses of round-headed trees, such as *fig.* 1524., though they might be seen to advantage in some situations, when grouping with other objects, yet, when contemplated by themselves, are quite uninteresting, from their dull and monotonous appearance; but add the poplars, as in *fig.* 1524 *a.*, and you immediately create an interest, and give a certain character to the group, which it did not before possess. The causes are these:—The poplars, which are taller than the other trees, are so distributed as to break the mass into several groups, each terminating in a point; and the central group, being larger than the others, predominates over them, and forms the mass into a whole. The pointed heads of the Lombardy

1524



poplars also form a pleasing contrast to the round heads of the other trees, and break the too uniform line exhibited in the sky outline of *fig.* 1524. The branches of the poplars, rising stiffly upwards, contrast with, and render more

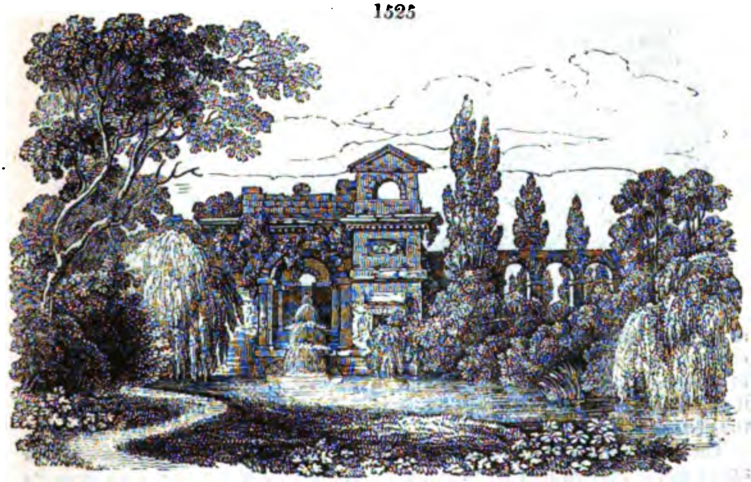
1524 a



graceful, the horizontal or pendent masses of the round-headed trees; and the stems of the poplars, being clear of branches to a greater height than the other trees, form an agreeable variety in the lower part of the group. (*Gard. Mag.*, vol. i. p. 19.)

The admirable effect of the Lombardy poplar, when planted so as to contrast advantageously with horizontal lines in architecture, may be seen in *fig.* 1525., which is a view of the artificial ruins of a Roman aqueduct, in the gardens of Schwezingen, in Baden. In this view may be also seen how drooping trees, such as the weeping willow, may be harmonised with spiry-topped trees, by the intervention of round-headed trees and shrubs. *Fig.* 1526. shows how easy it is to overpower a building by planting Lombardy poplars near it; this being actually the case at one of the entrances into the town of Carlsruhe, viz., the Ettlinger Thor, of which *fig.* 1526 is a portrait. *Fig.* 1527., the Tivoli Garden, at Vienna, shows too many Lombardy poplars, in proportion to the round-

1525



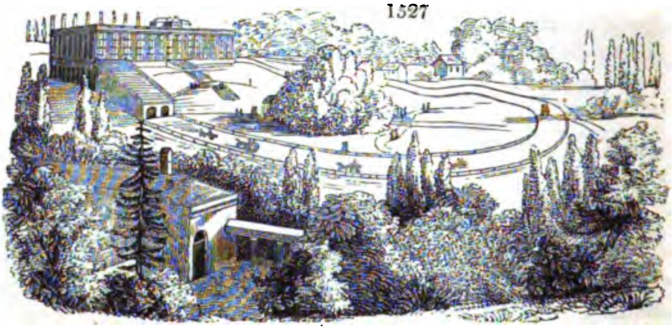
headed trees: and *fig.* 1528., the château de Neuviller, near Nancy, shows the Lombardy poplar overpowering a mansion; while *fig.* 1529., a sketch by Gilbert Laing Meason, from the background of a landscape by Domenichino, shows two Lombardy poplars, judiciously introduced as a supporting mass to the tower, which forms the leading feature of the building. *Fig.* 1530. and *fig.* 1531. are views of Pere la Chaise, showing the substitution of poplars for cypresses in a cemetery; and *fig.* 1532. the entrance to the botanic garden at

1526



Munich, shows their use in varying the margin of plantations. These examples may serve to show how easy it is, by means of the Lombardy poplar, to add to the effect of a landscape, or to destroy the harmony of its different parts. In short, the Lombardy poplar, like the weeping willow and birch, is a most dangerous tree in the hands of a planter who has not considerable knowledge and good taste in the composition of landscape. We have been induced to enlarge on the subject more than we should have done, from seeing the frequent misapplication of the tree in the neighbourhood of London, as well

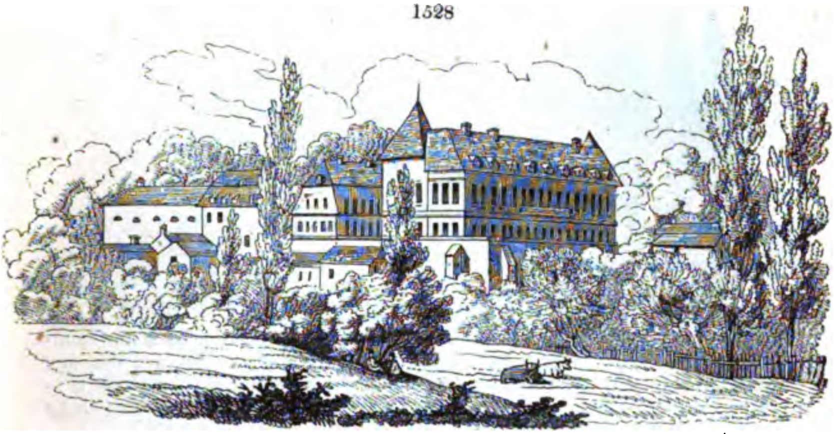
1527



as its good effects in various instances. We should like to see it much more common in towns, and in churchyards and cemeteries, and much less frequent in suburban gardens. In the grounds of extensive residences in the country, it ought to be sparingly introduced, unless the object be to recall the idea of the metropolis.

The suitableness of the Lombardy poplar for planting in towns and cities arises not only from its narrow form and vertical direction, but, also, from its nature; which, like its congener the *Pópulus nìgra*, admits of its thriving even among coal smoke, where most other trees would die, or become stunted and diseased. The elevation of the tree is also favourable for inviting and protecting singing-birds, in proof of which, a writer in the *Magazine of Natural History* (vol. i. p. 418.) observes that, in the towns of America, "the song of the Baltimore oriole (Orìolus baltimòrus) is little less remarkable than his fine appearance, and the ingenuity with which he builds his nest. His notes

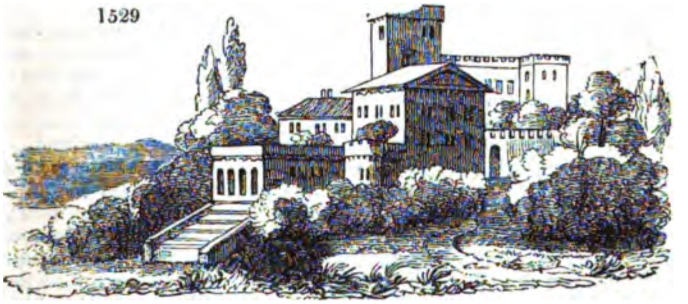
1528



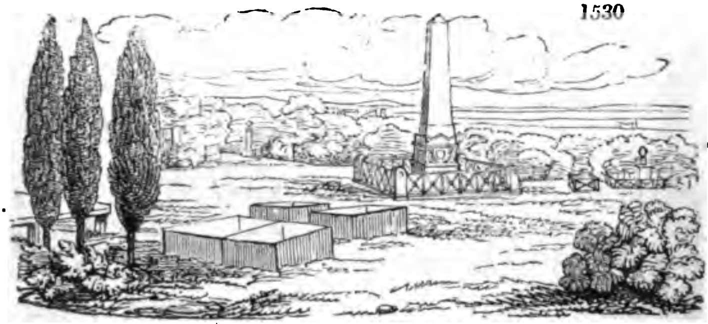
consist of a clear mellow whistle, repeated at short intervals as he gleams among the branches. There is in it a certain wild plaintiveness and *naïveté* extremely interesting. Since the streets of some of the American towns have been planted with Lombardy poplars, the orioles are constant visitors, chanting their native 'woodnotes wild,' amid the din of coaches, wheelbarrows, and sometimes within a few yards of a bawling oysterwoman."

A curious phenomenon is represented by Mr. Murray as taking place with this poplar. Speaking of the raining tree in the Island of Hierro, which supplies the inhabitants as well as inferior animals with water, he accounts for this effect, by stating that a cloud of vapour from the sea is impelled towards the tree; and, being condensed by its foliage, the rain falls into a large tank, from which it is measured out by individuals set apart for that purpose by the authorities of the island. The same effect, Mr. Murray alleges, takes place

1529



with very tall trees of this species surrounded by fog in this country. "In confirmation of a circumstance *primâ facie* so incredible," he says, "I have here to record a phenomenon, witnessed by myself, equally extraordinary. I had frequently observed, in avenues of trees, that the entire ground engrossed by their shady foliage was completely saturated with moisture; and that during the prevalence of a fog, when the ground beneath their pale was completely parched, the wet which fell from their branches more resembled a gentle shower than any thing else; and in investigating the phenomenon, which I am disposed to consider entirely electrical, I think the elm exhibits this feature more remarkably than any other tree of the forest. I never, however, was more astonished than I was in the month of September, 1828, on witnessing a very striking example of this description. I had taken an early walk on the road leading from Stafford to Lichfield; a dense fog prevailed, but the road


1530

was dry and dusty, while it was quite otherwise with the line of a few Lombardy poplars; for from them it rained so plentifully, and so fast, that any one of them might have been used as an admirable shower-bath, and the constant stream of water supplied by the aggregate would (properly directed) have sufficed to turn an ordinary mill." (*Mag. Nat. Hist.*, vol. iv. p. 34.)

In British nurseries, hedges for shelter are frequently formed of the Lombardy poplar; in which case they are cut over at a certain height, and regularly cut in on each side, so as to form a verdant wall, 8 ft. or 10 ft. high, 18 in. wide at bottom, and 6 in. wide at top. It is an excellent tree for sheltering or shading either fields or gardens in a flat country; but care must be taken to plant it at a sufficient distance; and, where shelter is wanted without shade, not to introduce it on the south side of any garden or orchard, unless at a distance of at least twice its ordinary height.

The Lombardy poplar, when Gilpin wrote his *Forest Scenery*, which was previously to 1780, had been only seen by that agreeable writer as a young tree. "Within these few years," he says, "the Lombardy poplar, which graces the banks of the Po, has been much introduced in English plantations. It seems to like a British soil, and its youth is promising; but I have never seen it in full maturity. Its conic form, as a deciduous tree, is peculiar. Among evergreens, we find the same character in the cypress; and both trees, in many situations, have a good effect. The cypress, often, among the ruins of ancient Rome, breaks the regularity of a wall or a pediment, by its conic form: and the poplar on the banks of the Po, no doubt, has the same effect among its deciduous brethren, by forming the apex of a clump; though I have been told that, in its age, it loses its shape, and spreads more into a head. The oldest poplars of this kind I have seen are at Blenheim. They are not old trees, but are very tall, and, I believe, still preserve their spiry form. One beauty the Italian poplar possesses, which is almost peculiar in itself; and that is the waving line it forms when agitated by the wind. Most trees, in this circumstance, are partially agitated: one side is in rest, while the other is in motion. But the Italian poplar waves in one simple sweep from the top to the bottom, like an ostrich feather on a lady's head. All the branches coincide in the motion: but, in painting, I know not that I should represent any kind of motion in a tree, except that of a violent storm. When the blast continues for some time, when the black heavens are in unison with it, and help to tell the story, an oak straining in the wind is an object of picturesque beauty; but when the gentle breeze, pressing upon the quivering poplar, bends it only in easy motion, while a serene sky indicates the heavens to be at peace, there is nothing to act in concert with the motion of the tree: it seems to have taken its form from the influence of a sea air, or some other malign impression; and, exhibiting an unnatural appearance, disgusts. One thing more I should mention with regard to the Italian poplar; which is, that, although it sometimes has a good effect when standing singly, it generally has a better when two or three are planted in a clump." (*Forest Scenery*, vol. i. p. 58.)

The Lombardy poplar, Sir Thomas Dick Lauder observes, though extremely fatiguing to the eye when it lines the road for many miles, as it does very

1531



generally in France, and occasionally in Italy, is often a very beautiful and natural accompaniment to buildings. "We have observed," he says, "a very whimsical effect produced by the long rows of these poplars in France, when seen crowning a distant elevation, where they have had to us all the appearance of an army drawn up; and we remarked that this whimsical deception very frequently occurred." (*Lauder's Gilpin*, vol. i. p. 116.) Mr. Sang considers the Lombardy poplar as a "very ugly tree;" a circumstance which we are rather surprised at in so enlightened an observer. The prevalence of these poplars in the vicinity of London, and other places in England, he says, he found tiresome in the extreme. Cobbett asserts the poplars to be a "very worthless family of trees;" and he adds, "That well-known, great, strong, ugly thing, called the Lombardy poplar, is very apt to furnish its neighbours with a surplus population of caterpillars, and other abominable insects." (*Woodlands.*)

Poetical and legendary Allusions. Some authors make Lombardy poplars the trees into which the sisters of Phaethon were changed. The unhappy virgins, say they, in their despair, clasped their hands above their heads, till they became fixed, and with the long hair which hung down and covered them like a veil, changed into leaves and branches, from which their tears stream incessantly. Notwithstanding the poetry of this idea, the Lombardy poplar could not be the tree alluded to by Ovid; since it has certainly been either originated in, or introduced into, Italy at a comparatively modern period, and consequently was not known to the ancients. The spiral form of this poplar, and the manner in which it waves in one mass, have been noticed by several of our modern poets. Leigh Hunt speaks of

> ——— "The poplar's shoot,
> Which, like a feather, waves from head to foot;"

and Barry Cornwall says, —

> ——— "The poplar there
> Shoots up its spire, and shakes its leaves i' the sun
> Fantastical."

The Isle of Poplars, in the Marquis de Girardin's gardens at Ermenonville, is celebrated for having been the place chosen by Rousseau for his own grave. The island is about 50 ft. long, and 30 ft. broad, and is situated at one end of a large lake. The only trees planted on the island are Lombardy poplars. A plan of the island may be seen in the *Encyclopædia of Gardening*, ed. 1835, p. 86.; and a view of the island and the tomb forms the frontispiece to Girardin's *Essay on Landscape*, &c.

1532



Soil, Situation, &c. The Lombardy poplar will only thrive on a tolerably good soil, and will not attain a large size, except in a situation where to a good soil is joined proximity to water. In the climate of London, it grows with such rapidity, that care is required, when it is introduced in ornamental plantations, to thin it out, or cut it down, so that its form may not preponderate in the landscape. In the north of England, and in most parts of Scotland, it does not thrive.

Statistics. Recorded Trees. Dr. Walker mentions a tree on the borders of a canal, near Brussels, which, in 15 years, attained the height of 80 ft., with a trunk from 7 ft. to 8 ft. in circumference. Another tree, at Nisbet, in Berwickshire, had, in 1795, attained the height of 60 ft. in 26 years; with a trunk 6 ft. 1 in. in circumference at 4 ft. from the ground. The largest tree that Sir Thomas Dick Lauder knows of in Scotland stands on the lawn, a little below the Castle of Tarnawa, in Morayshire. Phillips says the most extraordinary Lombardy poplars which he had seen were on the banks of the Seine, near Rouen. They had not been planted more than 20 years; "yet their height is such, as to make it quite awful to walk in the avenues." (*Syl. Flor.*, vol. ii. p. 133.) We wrote to our friend, the Abbé Gosier of Rouen, for some account of these trees; and his answer, dated March 4th, 1837, states, on the authority of M. Dubreuil, Conservator des Promenades publiques, &c., that they grow in alluvial soil, and are 150 ft. high. A tree, planted in 1758, in the St. Peter's Nursery, Canterbury, was blown down, Mr. Masters informs us, during the hurricane of Nov. 29. 1836. The trunk was upwards of 5 ft. in diameter at 1 ft. from the ground, and at 6 ft. it was 4 ft. 4 in. in diameter. It was nearly 100 ft. in height, very symmetrically formed, and from the northern and western entrances to Canterbury was an object of considerable attraction. The wood of the trunk was in a complete state of decay, and had produced an abundance of Polyporus igniàrius for several years past.

Existing Trees. In England, in the environs of London, at Ham House, Essex, it is 110 ft. high, with a trunk 3 ft. 10 in. in diameter; at Gunnersbury Park, 45 years planted, it is 84 ft. high, diameter of the trunk 2½ ft.; at Whitton, it is 115 ft. high. In Somersetshire, at Nettlecombe, 18 years old, it is 62 ft. high, the diameter of the trunk 1½ ft., and of the head 7½ ft.; in Surrey, at Walton upon Thames, 52 years planted, it is 110 ft. high, the diameter of the trunk 4 ft. 8 in.: in Cambridgeshire, in the parish of Gamlingay, it is 90 ft. high, the diameter of the trunk 2 ft. 10 in.; in the Cambridge Botanic Garden, it is 100 ft. high, the diameter of the trunk 5 ft., and of the head 30 ft.: in Denbighshire, at Llanbede Hall, 50 years planted, it is 73 ft. high, the diameter of the trunk 2½ ft., and of the head 12 ft.; in Durham, at Southend, 18 years planted, it is 45 ft. high; in Gloucestershire, at Doddington, it is 95 ft. high, diameter of the trunk 3 ft.; in Lancashire, at Latham House, 40 years planted, it is 80 ft. high, the diameter of the trunk 2 ft., and of the head 14 ft.; in Leicestershire, at Donnington Park, 60 years planted, it is 88 ft. high: in Oxfordshire, in the Oxford Botanic Garden, it is 80 ft. high, the diameter of the trunk 3½ ft., and of the head 18 ft.; in the village of Great Tew are some trees which are 125 ft. high, planted about 50 years ago, by a labourer who still lives near them: in Pembrokeshire, at Stackpole Court, 35 years old, it is 80 ft. high, the diameter of the trunk 3 ft., and that of the head 12 ft.; in Radnorshire, at Belvoir Castle, 18 years old, it is 50 ft high; in Staffordshire, at Rolleston Hall, it is 88 ft. high, with a trunk 2½ ft. in diameter; in Suffolk, at Finborough Hall, 80 years planted, it is 90 ft. high, the diameter of the trunk 2 ft., and of the head 80 ft.: in Warwickshire, at Coombe Abbey, 70 years planted, it is 85 ft. high, the diameter of the trunk 3 ft., and of the head 12 ft.: in Worcestershire, at Hagley, 9 years planted, it is 19 ft. high; at Croome, 30 years planted, is 70 ft. high: in Yorkshire, at Grimston, 14 years planted, it is 60 ft. high; at Knedlington, 11 years planted, it is 34 ft. high. In Scotland, in Lanarkshire, in the Glasgow Botanic Garden, 16 years planted, it is 65 ft. high; in Renfrewshire, at North Barr, 30 years planted, it is 70 ft. high; in Clackmannanshire, in the garden of the Dollar Institution, 12 years planted, it is 26 ft; in Inverness-shire, at Cowan, 45 years planted, it is 75 ft. high, the diameter of the trunk 1 ft., and of the head 12 ft.; in Perthshire, at Taymouth, it is 100 ft. high, the diameter of the trunk 1 ft. 2 in., and of the head 12 ft.; in Ross-shire, at Brahan Castle, it is 70 ft. high, the diameter of the trunk 2 ft. In Ireland, in Galway, at Coole, it is 30 ft. high, with a trunk 9 in. in diameter. In the Isle of Jersey, in Saunders's Nursery, 10 years planted, it is 36 ft. high, the diameter of the trunk 1 ft., and of the head 19 ft. In France, at Ermenonville, in the Isle of Poplars, are several 80 ft. high. In Belgium, at Ghent, in the Botanic Garden, 80 ft. high. In Saxony, at Wörlitz, 60 years old, it is 60 ft. high, with a trunk 1½ ft. in diameter. In Bavaria, at Munich, in the English Garden, 25 years old, it is 45 ft. high, the diameter of the trunk 12 in., and of the head 10 ft. In Prussia, at Berlin, in the Botanic Garden, 60 years old, it is 60 ft. high, with a trunk 2 ft. in diameter. In Italy, in Lombardy, at Monza, 40 years old, it is 90 ft. high, the diameter of the trunk 2½ ft., and of the head 10 ft.; at Belgiosa, near Pavia, 80 years planted, it is 70 ft. high, the diameter of the trunk 2 ft. 7 in.

Commercial Statistics. Plants, from 5 ft. to 6 ft. in height, are 8*s*. per hundred in the London nurseries; at Bollwyller, from 50 to 60 cents each.

♀ 12. *P.* ANGULA'TA *Ait.* The angled-*branched, or Carolina,* Poplar.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 407., ed. 2., 5. p. 396.; Michx. Arb., 3.; North Amer. Sylva, 2. p. 224.; Pursh Fl. Amer. Sept., 2. p. 619.; Lodd. Cat., ed. 1836.

Synonymes. P. angulòsa *Michx. Fl. Bor. Amer.*, 2. p. 243.; P. heterophýlla *Du Roi Harbk.*, 2. p. 150., *Mœnch Weissenst.*, 80., *Wangenh. Amer.*, 85.; P. macrophýlla *Lodd. Cat.*, edit. 1836; P. balsamifera *Mill. Dict.*, No. 5.; Mississippi Cotton Tree, *Amer.*

The Sexes. A plant at Ampton Hall, Suffolk, and one in the London Horticultural Society's arboretum, are both of the male sex. Michaux the elder has briefly described the flowers of both sexes, in his *Fl. Bor. Amer.*; but, as Michaux the son states, in his *North Amer. Sylva*, that his father had confounded P. angulàta and P. canadénsis together in his *Flora*, we cannot be sure that the part descriptive of the flowers under P. angulàta relates to this. It is given below, in the supposition that it may.

Engravings. Michx. Arb., 3. t. 12.; North Amer. Sylva, 2. t. 94.; Du Ham. Arb., 2. t. 39. f. 9.; Catesb. Carol., 1. t. 39.; our *fig.* 1533.; and the plates of this tree in our last Volume.

Spec. Char., &c. Bud not resinous, green. Shoot angled, with wings. Disk of leaf ovate, deltoid, acuminate, toothed with blunt teeth that have the point incurved, glabrous: upon the more vigorous shoots, the disk is heart-shaped, and very large. (*Pursh*, and *Michx. jun.*) The elder Michaux's description of the flowers under P. angulàta is as follows: — "Male flowers polyandrous; female flowers rather distantly placed upon the rachis, glabrous; the ovary subglobose." This description is liable to the exception above noted. In Martyn's *Miller*, the male catkins are said to be like those of P. nigra, and the anthers purple. P. angulàta, in North America, is, according to Pursh, a tree about 80 ft. high; its branches are very brittle, and its leaves are very large. It is wild in morasses on the banks of rivers between Virginia and Florida, and on the Mississippi. Introduced into England in 1738, and flowering in March.

Varieties.

- ✝ P. *a.* 2 *nòva* Audibert. — The plant of this variety in the London Horticultural Society's Garden being only 2 ft. high, we are unable to state in what respect it differs from the species.
- ✝ P. *a.* 3 *Medùsæ Booth.* — A plant in Messrs. Loddiges's collection, received under this name, in 1836, from Messrs. Booth of Hamburg, is not yet quite 1 ft. in height.

Description, &c. The shoots of this species, when young, are extremely succulent; and, as they continue growing late in the summer, they are frequently killed down several inches by the autumnal frosts. After the tree has attained the height of 20 ft. or 30 ft., which, in the climate of London, it does in five or six years, this is no longer the case; because the shoots produced are shorter and less suc-



1533

culent, and, of course, better ripened. According to Michaux, the leaves, when they first unfold, are smooth and brilliant, 7 in. to 8 in. long on young plants, and as much in breadth; while on trees 30 ft. or 40 ft. high they are only one fourth the size. The petiole, compressed in the upper part, renders the leaves easily agitated by the wind. "The annual shoots on young trees are very thick, distinctly striated, and of a green colour spotted with white; on branches of the second, third, and even of the seventh or eighth, years, the traces of the furrows are still observable: they are indicated by prominent red lines in the bark, terminating at the insertion of the young shoots, which ultimately disappear with the growth of the branches. This character belongs also to the cotton-wood (P. canadénsis); but, besides the difference of their general appearance, the two species are distinguished by their buds: those of the Carolina poplar (P. angulàta) are short, of a deep green, and destitute of the resinous substance which covers those of the cotton-wood (P. canadénsis), and of which the vestiges remain till late in the season. The wood of P. angulàta is white, soft, and considered of little use in North America. As an ornamental tree, it forms a very stately object; but, from the brittleness of the branches, they are very liable to be torn off by high winds. In the climate of Paris, the points of the shoots of the ter-

minal branches of trees are liable to be injured by severe frost; but in the climate of London this chiefly applies to plants in the nurseries. The Carolina poplar roots from cuttings with some difficulty; and, therefore, in British nurseries, it is commonly propagated by layers. In ornamental plantations, it ought always, as Miller advises, to be planted in situations where it will be sheltered by other trees; and, where it is wished to attain its full size, it ought always to be planted in good soil, and near water. In North America, where it grows in the swamps of Carolina, it is accompanied by the Taxòdium dístichum, Nýssa biflòra, A'cer rùbrum, C'arya aquática, Quércus lyràta, Pópulus canadénsis, and P. heterophýlla.

Statistics. Pópulus angulàta in Britain. At Syon, it is 83 ft. high, diameter of the trunk 3 ft., and of the head 61 ft.: see the plate of this tree in our last Volume. At Ham House, Essex, it is 70 ft. high, diameter of the trunk 2¼ ft., and of the head 45 ft. In Durham, at Southend, 15 years planted, it is 65 ft. high. In Suffolk, at Ampton Hall, 57 years planted, it is 64 ft. high; the diameter of the trunk 2 ft. 3 in., and of the head 95 ft. In Yorkshire, at Grimston, 12 years planted, it is 50 ft. high. In the Experimental Garden, Inverleith, 9 years planted, it is 15 ft. high.

Pópulus angulàta in Foreign Countries. In France, at Nantes, in the nursery of M. De Nerrières, 60 years old, it is 80 ft. high, with a trunk 1½ ft. in diameter; in the Botanic Garden at Avranches, 24 years planted, it is 50 ft. high; the diameter of the trunk 1½ ft., and of the head 30 ft. In Austria, at Vienna, in the University Botanic Garden, 8 years planted, it is 24 ft. high; at Brück on the Leytha, 70 years old, it is 80 ft. high, the diameter of the trunk 2½ ft., and of the head 48 ft. In Bavaria, at Munich, in the English Garden, 16 years old, it is 15 ft. high.

Commercial Statistics. Plants, in the London nurseries, are 1*s.* 6*d.* each; at Bollwyller, 1 franc and 50 cents; at New York, 20 cents.

☨ 13. *P.* HETEROPHY'LLA *L.* The various-*shaped*-leaved Poplar Tree.

Identification. Lin. Sp. Pl., 1464.; Ait. Hort. Kew., ed. 1., 3. p. 407., ed. 2., 5. p. 397.; Michx. Fl. Bor. Amer., 2. p. 244.; Willd. Arb., 233., Sp. Pl., 4. p. 806.; Pursh Fl. Amer. Sept., 2. p. 619.; Spreng. Syst. Veg., 2. p. 244.

Synonymes. *P. mágna,* foliis amplis, aliis cordiformibus, aliis subrotundis, primoribus tomentosis *Gron. Virg.*, 194. 157.; *P. cordifòlia Burgsdorf, Lodd. Cat.*, edit. 1836.; *P. argéntea Michx. North Amer. Sylva*, 2. p. 236. t. 97.; Cotton Tree, *Michx. N. A. S.*

The Sexes. Michaux the elder has noticed some characters of the flowers of both sexes in his character of the species in the *Fl. Bor. Amer.*; and they will be found translated in our specific character. Only the male is in British gardens.

Engravings. Michx. Arb., 3. t. 9.; Michx. North Amer. Sylva, 2. t. 97.; N. Du Ham., 2. t. 51.; and our *fig.* 1534.

Spec. Char., &c. Shoot round, tomentose. Leaf, while young, tomentose; afterwards less so, or glabrous. Petiole but slightly compressed. Disk roundish ovate, having a small sinus at the base, and being slightly auricled there (or, as Michaux, jun., has expressed it, with the lobes of the base lapped, so as to conceal the junction of the petiole), blunt at the tip, toothed; the teeth shallow, and having incurved points. Male flowers polyandrous. Female flowers glabrous, situated distantly along the glabrous rachis, and upon long pedicels. (*Michx. sen.*, and *Pursh.*) A tree, a native of North America, from New York to Carolina, in swamps, and more particularly in the country of the Illinois; and on the western rivers. It grows there to the height of 70 ft. or 80 ft.; flowering in April and May. It was introduced into England in 1765; but we have never seen plants of it higher than 5 ft. or 6 ft.;



1534

though a specimen tree in the Mile End Nursery, and another at Syon, must have been planted more than 50 or 60 years; and though it is said by Bosc to be a lofty tree in the neighbourhood of Paris. It is a very remarkable species, from the particular character of its leaves, which, though as large as, or larger than, those of *P.* angulàta, and something resembling them in outline and in position on the branches, yet have nearly cylindrical footstalks, and their disks hanging down on each side from the midrib in a flaccid manner, not observable in any other species of the genus. According to Michaux,

the trunks of trees of this kind, in North America, are covered with a very thick and deeply furrowed bark. The young branches and the annual shoots are round, instead of being angular, like those of *P.* angulàta, *P.* canadénsis, and *P.* monilífera. The leaves, while very young, are covered with a thick white down, which gradually disappears with age, till the leaves at last become perfectly smooth above, and slightly downy beneath. They are borne on long petioles; the disks are often 6 in. in length, and as much in breadth; of a thick nature, denticulated and heart-shaped, with the lobes of the base lapped, so as to conceal the junction of the petiole. The catkins are drooping, and about 3 in. long, which is about half the length of those of *P.* angulàta. "The wood," Michaux adds, "is soft and light, with the heart yellowish, and inclining to red; and the young branches are filled with a pith of the same colour. The tree is said to flourish in France, where, as in America, its wood is held in little esteem. Both in French and British nurseries, it is propagated only by inarching and by layers. It well deserves culture as an ornamental tree, in rich moist soil, in a sheltered situation, where its large leaves will not be in danger of being torn by the wind. The male catkins are produced in great abundance; and, being very thick, though not very long, they make a fine appearance, from their rich brownish red and yellow colour. Plants, in the London nurseries, are 2*s.* 6*d.* each; at Bollwyller, 2 francs; and at New York, 20 cents.

☨ 14. *P.* BALSAMI'FERA *L.* The balsam-bearing Poplar, *or Tacamahac Tree.*

Identification. Lin. Syst. Vég., 45., Mat. Med., 215.; Pall. Fl. Ross., 1. p. 67. t. 41.; Ait. Hort. Kew., ed. 2., 5. p. 397.; Willd. Arb., 230., Sp. Pl., 4. p. 805.; Michx. Arb., 3.; North Amer. Sylva, 2. p. 237. t. 98.; Pursh Fl. Amer. Sept., 2. p. 618.

Synonymes. *P. Tacamahàca* Mill. Dict., No. 6.; the Tacamahac, *Amer.*; le Baumier, *Fr.*; Peuplier liard, and also Tacamahac, in *Canada*; Balsam Pappel, *Ger.*

The Sexes. Plants of the male are in English gardens. The female is figured in Pallas's *Flora Rossica*, 1. t. 41. One or two flowers, clearly bisexual, have been found in a catkin of otherwise male flowers, borne by a tree in the Botanic Garden at Bury St. Edmunds, previously to 1830, which bore, at the same time, other catkins of male flowers. Miller mentions that a tree in the Chelsea Botanic Garden also produced both male and female flowers.

Engravings. Michx. Arb., 3. t. 13. f. 1.; North Amer. Sylva, 2. t. 98. f. 1.; Du Ham. Arb., ed. nov., 2. t. 50.; Pall. Fl. Ross., 1. t. 41.; Wangh. Amer., t. 28. f. 59.; Trew Ehret., t. 46.; Catesb. Car., 1. t. 34.; Gmel. Sib., 1. t. 33.; Pluk. Alm., t. 281. f. 1.; our *fig.* 1535. of the male plant; *fig.* 1536. of the female; and the plate of this tree in our last Volume.

Spec. Char., &c. Shoot round. Bud very gummy. Petiole round. Disk of leaf ovate-acuminate, or ovate-lanceolate, serrated with adpressed teeth; deep green on the upper surface, whitish on the under one, and tomentose there, but rather inconspicuously so, and netted with glabrous veins. Stipules subspinescent, bearing gum. Stamens 16, or more. (*Willd.*, *Michx. jun.*, and obs.) A tree, a native of North America, and in Dahuria and Altai. It was cultivated in England as early as 1692, in the Royal Gardens at Hampton Court. (*Ait. Hort. Kew.*) It flowers in March, in North America (*Pursh*); in April, in England (*Ait. Hort. Kew.*); and the female, in Dahuria, in May. (*Pallas.*) In the climate of London, according to Miller, the male flowers come out in long catkins in April and May, and fall off soon after: their stamens are numerous, irregular in height, and crowned with bearded anthers of a purple colour. The hermaphrodite flowers are produced at the end of the shoots, upon long slender peduncles, in very loose catkins, having a leafy involucre under each, which is oval and entire; and from the bosom of that arises the peduncle, which is very short. Upon the top is placed the petal, or calyx (or nectary, according to Linnæus), shaped like a wide cup, having a style in the centre, and two stamens on one side, terminated by pyramidal purple anthers. The female flowers are succeeded by oval capsules, terminating in a point, and enclosing downy seeds. (*Mart. Mill.*)

Varieties.

☨ P. *b.* 2 *viminàlis*; *P.* viminàlis *Lodd. Cat.*, ed. 1836; *P.* salicifòlia *Hort.*; *P.* longifòlia *Fischer*, *Pall. Ross.*, t. 41. B; is a native of Altai, with

slender twiggy branches, and leaves nearly lanceolate. There are plants in Messrs. Loddiges's arboretum.

♀ P. *b.* 3 *latifòlia* Hort. has the leaves rather broader than those of the species. There is a tree of this kind, in the London Horticultural Society's Garden, 12 ft. high.

♀ P. *b.* 4 *intermèdia* Hort., Pall. Fl. Ross., t. 41. A, is a native of Dahuria, with stout, short, thick branches, knotted with wrinkles; and ovate, long, and rather narrow leaves; and generally attaining only the height of a large shrub. There is a plant, in the London Horticultural Society's Garden, 10 ft. high, by which it appears to be quite distinct from *P.* b. viminàlis.

♀ P. *b.* 5 *suavèolens*; *P.* suavèolens *Fischer*, and *Lodd. Cat.*, ed. 1836. The new sweet-scented poplar of the nurseries. — The plant in Messrs. Loddiges's collection is not 1 ft. high; and we have not been able to identify it in any other collections; though it must have been plentiful in 1834, since in the wholesale priced *Catalogue* of the Kensington Nursery for that year the price of plants is stated to be 10*s*. per hundred.

♀ P. *b.* 6 *fòliis variegàtis* Miller has variegated leaves. There is a tree of this kind in the London Horticultural Society's Garden.



1535

Description. The balsam poplar, in North America, according to Michaux, attains the height of 80 ft., with a trunk 3 ft. in diameter, and roots spreading close under the surface, and throwing up numerous suckers. In Siberia, according to Pallas, it is only a middle-sized tree; and in Dahuria and Altai, a low tree, or large shrub. According to Franklin, in the northern parts of North America, the trunk of the balsam poplar attains a greater circumference than that of any other tree. The head of the tree, in North America, is conical; but in Russia it is roundish. The trunk is covered with an ash-coloured bark; and the wood, in Siberia, is said to be reddish, being closer and a little harder than that of other poplars. In the moist plains of Dahuria, the tree is shrubby, because, according to Pallas, the grass is annually fired there; and the young shoots of all the trees being thus injured, they are seldom found rising with a clear stem. In the spring, the balsam poplar is known from all other species by the fine tender yellow of its leaves when they are first developed; the abundance of the yellow glutinous balsam with which the buds are covered, the very strong odour which this balsam diffuses throughout the surrounding atmosphere, and the comparatively rigid and fastigiate habit of growth of the tree, which approaches, in the latter respect, nearer to *P.* fastigiàta than any other species. When mature, the leaves become of a deep green colour above, and of a rusty silvery white beneath. This is one of the hardiest of poplars, though not of rapid growth; except the first three or four years in the nursery. Bosc observes that botanists often confound this species with *P.* cándicans; but that cultivators never do so, from the very different manner of its growth, and from

1536



the greater difficulty that is found in propagating it. The tree is wild in Lower Canada, more particularly between Quebec and Hudson's Bay; and in various places between lat. 47° and 49°. It is not very common about Montreal; and is rare on the shores of Lake Champlain. In Franklin's *First Journey*, it is stated, that it is found as far north as the Great Slave Lake; and that Mackenzie River has been named Rivière aux Liards, from the abundance of the tree in that quarter. It also constituted, Captain Franklin observes, "the greatest part of the drift timber that we observed on the shores of the Arctic Sea. Its Cree name is Matheh-metoos, which means the ugly poplar." (*First Journey*, &c., p. 753.) The balsam poplar was first brought from Canada to the Island of Jersey, and propagated there. Six of these plants were sent to Caroline, consort to George II., in the year 1731, under the name of arbre de la reine One of these was given by the queen to Sir Hans Sloane; and, being planted in the Botanic Garden at Chelsea, it soon produced male catkins; but no female or hermaphrodite ones, till about the year 1760. This poplar was introduced into Scotland, according to Dr. Walker, in 1768, having been raised in a nursery-ground at Leith, in that year, from seeds sent from Canada. The wood of the tree is white and soft, and not used in the arts by the Canadians, according to Michaux; but Franklin observes that, though it burns badly, and gives little heat, when green, its ashes yield a large quantity of potash. The balsam from the buds used formerly to be sent from Canada, and other parts of North America, in shells, under the name of baume focot; having been collected from the trees in spring, when, in consequence of the heat, it is dissolved, and collects into drops on the points of the buds. It is of a smooth and even texture, and is soluble in spirits of wine. In Siberia, a medicated wine is prepared from the buds, which is diuretic, and considered serviceable in the scurvy. Pallas states that the grouse, and other birds of that family, that feed on the buds of this poplar during winter, have their flesh imbued with a grateful balsamic flavour. In Europe, the only application of this tree is to ornamental purposes; and though, when it grows old and scrubby, it may merit the Cree name of "ugly poplar," yet, when young, few trees can be compared with it in the beginning of summer, either for the light rich yellow green of its foliage, or the fine balsamic odour which proceeds from both the leaves and the buds. In scenery of limited extent, and when the round-headed trees and buildings are comparatively small, or of medium size, the balsam poplar may be used for the same purposes as the Lombardy poplar. (See p. 1663.) The balsam poplar is readily propagated by suckers, which it sends up in abundance; or by cuttings, which, however, do not strike so readily as those of the other poplars. It will grow in any soil, but it prefers one moist and rich, and a sheltered situation.

Statistics. Recorded Trees. Near Edinburgh, in the pleasure-grounds of Craig Lockhart, a tree, planted in 1771, was, in 1798, 50 ft. high, and had a trunk 4 ft. in circumference at 4 ft. from the ground. It was at that time considered the oldest and finest balsam poplar in Scotland. (*Walker's Essays.*)

Existing Trees. In England, in Bedfordshire, at South Hill, it is 50 ft. high, the diameter of the trunk 11 in., and of the head 26 ft.; in Hertfordshire, at Cheshunt, 6 years planted, it is 23 ft. high: in Monmouthshire, at Tredegar Park, 50 years old, it is 45 ft. high; at Dowlais House, 15 years old, it is 20 ft. high: in Pembrokeshire, at Stackpole Court, 7 years planted, it is 20 ft. high; in Staffordshire, at Alton Towers, 4 years planted, it is 16 ft. high; in Yorkshire, at Hackress, 16 years planted, it is 14 ft. high. In Scotland, in the Experimental Garden, Inverleith, 9 years planted, it is 12 ft. high; in Banffshire, at Gordon Castle, it is 56 ft. high, the diameter of the trunk 2 ft. 3 in.; in Clackmannanshire, in the Garden of the Dollar Institution, it is 28 ft. high, diameter of the trunk 2¼ ft., and of the head 10 ft.; in Fifeshire, at Danibristle Park, 16 years planted, it is 40 ft. high; in Forfarshire, at Courtachy Castle, 18 years planted, it is 45 ft. high, diameter of the trunk 2 ft., and of the head 7 ft; in Perthshire, in Messrs. Dickson and Turnbull's Nursery, Perth, 26 years planted, it is 48 ft. high. In Ireland, in Galway, at Coole, it is 36 ft. high, the diameter of the trunk 1 ft. In the Isle of Jersey, in Saunders's Nursery, 10 years planted, it is 14 ft. high, the diameter of the trunk 7 in., and of the head 12 ft. In Bavaria, at Munich, in the English Garden, 25 years old, it is 20 ft. high, the diameter of the trunk 9 in., and of the head 8 ft.

Commercial Statistics. Plants, in the London nurseries, 4 ft. high, are 8*s.* per hundred; and of the new sweet-scented variety, 10*s.* per hundred. At Bollwyller, plants are 1 franc each; and at New York, 20 cents each.

♀ 15. *P.* CA'NDICANS *Ait.* The whitish-*leaved balsam-bearing*, or *Ontario*, Poplar.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 406., ed. 2., 5. p. 397.; Willd. Arb., 231., Sp. Pl., 806.; Michx. Arb.; North Amer. Sylva, 2. p. 239. t. 98. f. 2.; Pursh Fl. Amer. Sept., 2. p. 618.; Spreng. Syst. Veg., 2. p. 244.

Synonymes. *P.* macrophýlla *Lindl.* in *Encyc. of Plants*, p. 840., and *Lodd. Cat.*, 1836; *P.* latifòlia *Mœnch Meth.*, p. 338.; *P.* ontariénsis *Desf. Hort. Par.*, and *Lodd. Cat.*, 1836; *P.* cordàta *Lodd. Cat.*, 1836; *P.* canadénsis *Mœnch Weissenst.*, 81., but not of *Michx.* which is *P.* lævigàta *Willd.*; Balm of Gilead Tree, *Boston, North Amer.*; Peuplier liard, *Canada*; Peuplier à Feuilles vernissées, *Fr.*

The Sexes. The male is in the London Horticultural Society's Garden; the female is in the Duke of Wellington's garden at Apsley House, London.

Engravings. Catesb. Car., 1. t. 34.; Michx. Arb.; Michx. North Amer. Sylva, 2. t. 98. f. 2.; and our *fig.* 1537.

Spec. Char., &c. Shoot round. Bud very gummy. Stipules gummy. Petiole compressed in its upper part, hairy in many instances. Disk of leaf heart-shaped at the base, ovate, acuminate; serrated with blunt, unequal teeth; 3-nerved; deep green on the upper surface, whitish on the under one, on which the veins appear reticulate. Inflorescence similar to that of *P.* balsamífera (*Michx. jun.*, *Pursh*, *Spreng.*, and obs.) The disk of the leaf is thrice as large as that of *P.* balsamífera. (*Michx. jun.*) A tree, attaining the height of 40 ft. or 50 ft., with a trunk 18 in. or 20 in. in diameter, in the states of Rhode Island, Massachusetts, and New Hampshire; flowering, with the balsam poplar, in March. It was introduced into England in 1772, and is frequent in gardens.

Description, &c. The Ontario poplar bears a close general resemblance to the balsam poplar: it has the rigid fastigiate habit of that tree, its fine fragrance, and its property of throwing up numerous suckers; but it differs from it, in having very large heart-shaped leaves, and in attaining a larger size, both in its native country, and in British gardens. The buds are covered with the same balsamic substance as those of *P.* balsamífera; and the leaves are of the same fine yellow colour in spring, and, like those of the balsam poplar, preserve, at all stages of their growth, the same shape. The foliage, when mature, is tufted, and of a dark green; the disposition of the branches is somewhat rigid and irregular; which last circumstance prevents the foliage from massing well together, and gives the tree rather an inelegant appearance. The trunk is covered with a smooth greenish bark, which becomes darker with age; the wood is soft; and, like that of the balsam poplar, is chiefly valuable for producing potash. Michaux never found the tree in forests in America, nor was he able to discover where it was indigenous; but he found it growing commonly before houses, both in the towns and country. Pursh mentions New England as the place where he had seen it in a living state. In British gardens, it has very frequently been confounded with the balsam poplar; and the same thing, Bosc informs us, often happens in France. Bosc strongly recommends this tree for its shade, and the fragrance with which it perfumes the air in spring. It is readily propagated by cuttings or suckers, but will not attain a large size unless on rich soil near water; though, as the roots creep along the surface, the soil need not be deep.


1537

Statistics. In England, in Buckinghamshire, at Temple House, 40 years planted, it is 70 ft. high; the diameter of the trunk 2 ft., and of the head 30 ft.; in Durham, at Southend, 7 years planted, it is 20 ft. high; in Hertfordshire, at Cheshunt, 18 years planted, it is 45 ft. high; in Nottinghamshire, at Clumber Park, 10 years planted, it is 48 ft. high; in Warwickshire, at Whitley Abbey, 7 years planted, it is 24 ft. high. In Scotland, near Edinburgh, at the Experimental Garden, Inverleith, 9 years planted, it is 23 ft. high; in Fifeshire, at Danibristle Park, 9 years planted, it is 23 ft. high; in Stirlingshire, at Callender Park, 16 years planted, it is 70 ft. high In Ireland, at Dublin, in the Glasnevin Botanic Garden, 30 years planted, it is 30 ft. high. In Germany, at Vienna, in the garden of Baron Loudon, 30 years old, it is 24 ft. high. Price of plants as in *P.* balsamífera.

CHAP. CIV.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER BETULA'CEÆ.

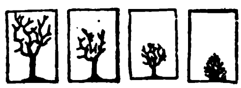
These are included in two genera, the characters of which are thus given by Smith: —

A'lnus *Tourn.* Barren flowers numerous, aggregate, in a loose cylindrical catkin, imbricated every way. Calyx a permanent wedge-shaped scale, 3-flowered, with 2 very minute lateral scales. Corolla composed of 3 equal florets, attached to the inner side of every scale, each of one petal, in 4 deep, equal, ovate, obtuse segments. Filaments 4, from the tube of the corolla, shorter than its segments, and opposite to them. Anthers of 2 round lobes.—Fertile flowers fewer, aggregate, in an oval firm catkin, imbricated every way. Calyx a permanent, wedge-shaped scale, 2-flowered. Corolla none. Germen compressed, of 2 cells. Styles 2, parallel, tapering, a little prominent, deciduous. Stigma simple. Nut ovate, bony, compressed, angular, without wings, of 2 cells. Kernels solitary, ovate, acute.—Trees, with leaves alternate, stalked, simple, wavy or cut, deciduous, with twin deciduous stipules. Catkins terminal, panicled, pendulous, earlier than the foliage. (*Eng. Fl.*, iv. p. 134.) Natives of Europe and North America.

Be'tula *Tourn.* Barren flowers. Catkin cylindrical, lax, imbricated all round with ternate concave scales; the middle one largest, ovate. Corolla none. Filaments 10—12, shorter than the middle scale, to which they are attached. Anthers roundish, 2-lobed.—Fertile flowers. Catkin similar, but more dense; scales horizontal, peltate, dilated outwards, 3-lobed, 3-flowered. Corolla none. Germen compressed, bordered, of 2 cells. Styles 2, awl-shaped, downy. Stigma simple. Nut oblong, deciduous, winged at each side, of one cell, with a solitary kernel.—Trees or shrubs, very hardy, with round slender branches; scattered, stalked, simple, serrated, deciduous leaves; and a hard, often veiny, wood. Bark, in several species, of many fine, soft, membranous layers. (*Eng. Fl.*, iv. p. 153.) Natives of Europe, North America, and Asia.

The alder and the birch were made separate genera by Tournefort, and by Linnæus also, in his earlier works; but he afterwards united both genera into one, under the name of *Bétulus*. Modern botanists, for the most part, follow Tournefort; and the following are the distinctive characteristics of his two genera: — In *Bétula*, the female catkins are cylindrical, solitary, on simple peduncles, and bear their seeds furnished with a membrane on each side. In *A'lnus*, the female catkins are oval; and they are borne on a branchy peduncle, containing seeds which are not bordered with membranes. As secondary characteristics, the birches prefer dry places, and the alders moist situations. All the known species of alder may be reduced to three or four; and all the species of birch which are hardy in England to four or five. Most of the species of both genera flower and fruit freely in the climate of London.

Genus I.



A'LNUS *Tourn.* The Alder. *Lin. Syst.* Monœ'cia Tetrándria.

Identification. Tourn., t. 359.; Willd. Sp. Pl., 4. p. 334.; Hall. Hist., 2. p. 300.; Comp., ed. 4., p. 176.; Gærtn., t. 90.

Synonymes. *Bétulæ* species *Lin.*; Aune, *Fr.*; Erle, *Ger.*; Ontano, *Ital.*; Aliso, *Span.*

Derivation. From *al*, near, and *lan*, the edge of a river, *Celtic*; in reference to its habitat: from the Hebrew, *alon*, an oak: or, according to others, from *alitur amne*, it thrives by the river.

Description, &c. Trees, rarely exceeding the middle size; and some so low as to be considered shrubs. With the exception of *A.* glutinòsa laciniàta and *A.* cordifòlia, the species are not very ornamental; nor is the timber of great value, except for the charcoal which may be made from it. All the species prefer a moist soil, or one in the vicinity of water. *A.* glutinòsa ripens seeds freely, as do most of the other sorts; but all the latter are generally propagated by layers. The only truly distinct species appear to us to be, *A.* glutinòsa, *A.* cordifòlia, *A.* incàna, *A.* oblongàta, and *A.* víridis; which last seems an intermediate species, or connecting link, between *A'*lnus and *B*étula.

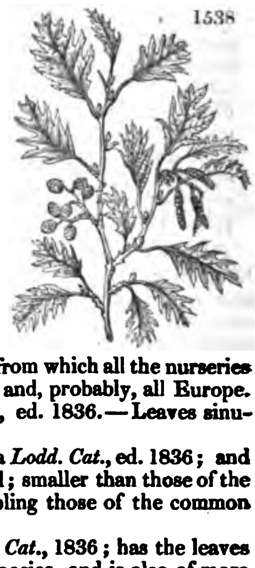
♀ 1. *A.* GLUTINO'SA *Gærtn.* The glutinous, *or common*, Alder.

Identification. Gærtn., 2. p. 54.; Willd. Sp. Pl., 4. p. 334.; Comp., ed. 4., p. 155.; Hook. Lond., t. 59., Scot., 271.; Hoss. Anleit., 186.; Lodd. Cat., ed. 1836.
Synonymes. *B*étulus *A'*lnus *Lin. Sp. Pl.*, 1394. *a*, *Fl. Br.*, 1013., *Eng. Bot.*, 21. t. 1508.; *B.* emarginàta *Ehrh. Arb.*, 9.; *A'*lnus *Raii Syn.*, 442.; Aune, *Fr.*; gemeine Else, or Elser, or schwartz Erle, *Ger.*; Elsenboom, *Dutch*; Alno, or Ontano, *Ital.*; Aliso, or Alamo nigro, *Span.*
Engravings. Eng. Bot., t. 1508.; Hunt. Evel. Syl., 240. f.; Ger. Emac., 1477. f.; Lob. Ic., 2. 191. f.; Loes. Pruss., t. 1.; Dalech. Hist., 97. f.; our *fig.* 1540.; and the plate of this species in our last Volume.

Spec. Char., &c. Leaves roundish, wedge-shaped, wavy, serrated, glutinous, rather abrupt; downy at the branching of the veins beneath. (*Eng. Fl.*, iv. p. 131.) A tree, from 30 ft. to 60 ft. high; a native of Europe, from Lapland to Gibraltar; and of Asia, from the White Sea to Mount Caucasus; and, also, of the north of Africa; flowering, in Britain, in March and April.

Varieties.

♀ A. *g.* 2 *emarginàta* Willd. Baum., p. 19., has the leaves nearly round, wedge-shaped, and edged with light green.


1538

♀ A. *g.* 3 *laciniàta* Ait. Willd., l. c., Lodd. Cat., ed. 1836; *A.* g. incìsa *Hort.*; our *fig.*1538., and the plate of a fine tree at Syon, in our last volume; has the leaves oblong and pinnatifid, with the lobes acute. Wild in the north of France, particularly in Normandy, and in the woods of Montmorency, near Paris. (*N. Du Ham.*) Thouin, in the year 1819, in the *Nouveau Cours d'Agriculture*, states that the cut-leaved alder was first found by Trochereau de la Berlière, and planted by him in his garden near St. Germain, where the stool still remains from which all the nurseries of Paris have been supplied with plants, and, probably, all Europe.

♀ A. *g.* 4 *quercifòlia* Willd., l. c., Lodd. Cat., ed. 1836.—Leaves sinuated, with the lobes obtuse.

♀ A. *g.* 5 *oxyacanthæfòlia*; *A.* oxyacanthæfòlia *Lodd. Cat.*, ed. 1836; and our *fig.* 1539.—Leaves sinuated and lobed; smaller than those of the preceding variety, and somewhat resembling those of the common hawthorn.

♀ A. *g.* 6 *macrocárpa*; *A.* macrocárpa *Lodd. Cat.*, 1836; has the leaves and fruit rather larger than those of the species, and is also of more vigorous growth.

♀ A. *g.* 7 *fòliis variegàtis* Hort. has the leaves variegated.

Other Varieties. There are some other names applied to plants in the collection of Messrs. Loddiges, which, we think, can only be considered as varieties of *A.* glutinòsa; or, perhaps, of *A.* incàna; but the plants are so small, that we are unable to determine whether they are sufficiently distinct to be worth recording. Among these names are, A. *nìgra*, A. *rùbra*, A. *plicàta*, and A. *undulàta*. *A.* rùbra is said to be a native of the Island of Sitcha. (*Annal. des Scien. Nat.*, 3. p. 237.) Some of the sorts treated as

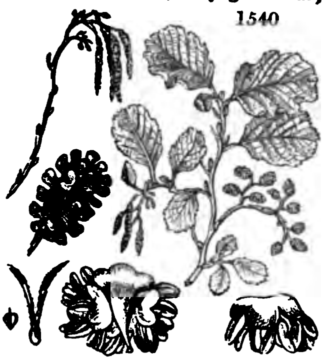
species we think only varieties, as we have indicated by putting the letter g. in parentheses.



1539

Description. The alder, in a wild state, even in favourable situations, is seldom seen higher than 40 ft. or 50 ft.; but in uncultivated grounds, and in good soil near water, it will attain the height of 50 ft. or 60 ft., and upwards. This is not only the case with the species, but with the variety *A.* g. laciniàta, which forms a handsome pyramidal tree; which, at Syon, has attained the height of 63 ft., and at Woburn Farm, near Chertsey, is still higher. The bark of the common alder, in oldish trees, is nearly black, and full of clefts; the colour of the wood is white before the tree is cut down; but, immediately on being cut, the surface of the wound becomes of a deep red; soon fading, however, into the pale flesh-colour, which the whole of the wood of this tree, when cut down, takes when dry, and retains ever afterwards. The wood is homogeneous, tender, and without much tenacity. The branches, when they are young, and the tree is in a state of vigorous growth, have a triangular form; but, when mature, they are round. The bark, at the rising of the sap, separates from the wood with very great facility. The leaves, when in the bud, are folded in the manner of a fan, very glutinous, and completely enclosed by two oblong stipules of a whitish green. They are from 3 in. to 4 in. long, and nearly as broad. The petiole is about 1 in. long, and prolonged on the disk of the leaf, in the form of a very prominent nerve on the under side, from which proceed to the right and left other prominent nerves, in each of the axils formed by which is a little tuft of cottony hair. The characteristics of the leaves of this species, as compared with those of other species of the genus, and especially of *A.* incàna, is, that they are always rounded at the summit, and never pointed; though this distinction does not hold good when applied to some of the varieties, such as *A.* g. laciniàta. The leaves are of a deep dark green; and both the young shoots and leaves are covered with a glutinous substance, more especially in the early part of summer. The male catkins are cylindrical, like those of the birch, and appear in the autumn; while the female ones, which are on branched footstalks, are of a short conical form, like a small fir cone, and are produced in spring along with the leaves. On Mount Caucasus, Pallas informs us, the female catkins come out about the end of February; but, in the north of Russia, in March and April. The rate of growth of the alder, in a favourable soil and situation, is about 2 ft. or 3 ft. a year for four or five years; so that a tree 10 years planted will frequently attain the height of 20 ft. or 25 ft.; and at 60 years the tree is supposed to have arrived at maturity. The roots are creeping; and sometimes, but rarely, they throw up suckers. The shade and fallen leaves of this tree are not injurious to grass.

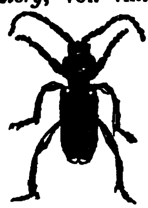
1540



Geography, History, &c. The common alder is the most aquatic of European trees, being found in wet swampy grounds, throughout the whole of Europe, in situations too moist for even the willow and the poplar. In meadows, and by river sides in the plains, it becomes a considerable tree; but on mountains, and in the most northerly parts of Sweden, it diminishes to a shrub. It is found in the west, east, and north of Asia, and in the north of

Africa. According to Pursh, the common alder is also a native of North America; in the interior of Canada, and on the north-west coast. The alder was known to Homer and Theophrastus. (See p. 18.) According to Virgil, it formed the first material for boats; and Lucan recommends it as a wood proper for ship-building. Virgil describes the proper situation for it, as on the margin of still waters; and Vitruvius recommends the wood for piles, stating that the city of Ravenna was built on it. Aristotle mentions that the alder was generally barren in Greece, and only fertile in the island of Crete; but it may be doubted whether he alludes to the same tree. In the time of Theophrastus, the bark was used for dyeing leather; and, in the days of Pliny, the wood was employed for piles, which he calls "eternal;" and for pipes, for conveying water under ground, as it is at present. The same author states that the tree was planted along the banks of rivers, to prevent them, by its numerous roots and suckers, from being washed away during extraordinary floods. Evelyn tells us that the celebrated bridge of the Rialto, at Venice, was built on piles of this tree. It is still extensively used in Flanders and Holland, for the purpose of forming piles. Boutcher, writing in 1780, informs us that, between 1730 and 1750, "vast quantities of alder plants were brought from Holland to Scotland, at a considerable price, and unhappily for the owners, planted in large tracts of moist land, from which no returns suitable to the labour and expense had been received." He adds that he would greatly have preferred "poplars and abeles." (*Treatise*, &c., p. 111.)

Properties and Uses. Naturally, the leaves of the alder afford food to the larvæ of different species of moths, and other insects; and the leaves and young shoots are eaten by horses, cows, goats, and sheep, though they are not fond of them; and they are refused by swine. Among the lepidopterous insects may be mentioned several species of the genus Hippárchia Fab. Satúrnia Schrank. (See *Magazine of Natural History*, vol. viii. p. 210., and vol. v. p. 251.) Clýtus álni *Fab.*, a coleopterous insect, is common in the trunks of old alder trees. C. Arìetis *Fab.*, Cerámbyx Arìetis *L.*, *Sam.* pl. 2. f. 25., and our *fig.* 1541., is also common. The tongues of horses feeding upon the alder, Linnæus observes, are turned black; and, on that account, it is supposed by some persons to be unwholesome for them. The uses to which the alder has been applied by man are various. The wood, though soft, is of great durability in water. It weighs, when green, 62 lb. 6 oz.; half-dry, 48 lb. 8 oz.; and quite dry, 39 lb. 4 oz., per cubic foot; thus losing above a third of its weight by drying, while it shrinks about a twelfth part of its bulk. In the *Dictionnaire des Eaux et Forêts*, the wood is said to be unchangeable either in water or earth. It is used for all the various purposes to which soft homogeneous woods are generally applied; viz. for turnery, sculpture, and cabinet-making; for wooden vessels, such as basins, plates, and kneading-troughs; for sabots, wooden soles to shoes and pattens, clogs for women, and similar purposes. In France, sabots made of alder wood are smoked, to render them hard and impervious to the larva of the beetle which attacks that wood. The French, and also the Highlanders, are said to make light chairs of the wood of this tree, which have the colour, though they have not the grain, of mahogany. Sir Thomas Dick Lauder, speaking of the wood, says, "It is extremely valuable, even when of a small size, for cutting up into herring-barrel staves; and thus whole banks, in Scotland, have been denuded every year of this species of timber. The old trees, which are full of knots, cut up into planks, have all the beauty of the curled maple, with the advantage of presenting a deep, rich, reddish tint; and, in this state, they make most beautiful tables. It must be remembered, however, that the alder timber is liable to be perforated by a small beetle; it should, therefore, if possible, be prepared by immersing the logs in a large hole dug in a peat moss, and impregnating the water of the hole with a quantity of lime. If this be done for



1541

a few months, and the furniture afterwards well varnished over with what is called the French polish, it will stand unharmed for generations." (*Lauder's Gilpin*, vol. i. p. 137.) Wood of alder, which has lain a long time in peat bogs, becomes as black as ebony; and as, in a recent state, it readily receives a black dye, while, from the homogeneousness of its texture, it will take a better polish than soft woods do generally, it forms a very common substitute for that wood in small articles; but it has always a dull hue, being incapable of receiving the lustre of the real ebony. When used in constructions above ground, it ought only to be placed in situations where it will be kept perfectly dry: but the great use of the wood, on a large scale, is for piles, as foundations for bridges and other buildings, water-pipes, barrels of pumps, and props for mines. The spray is more durable than that of most other trees, when used for filling drains in moist soil. Dorsetshire woodwards (woodmen), Mitchell observes, " have nearly the same adage applied to alder poles, when peeled for rafters, as those of the midland counties have for willows and poplars (see p. 1637.); viz: —

" Thatch me well, and keep me dry,
Heart of oak I will defy."

" Stakes of alder," he says, " will not stand twelve months, nor will the timber do for posts, or anything else, where it is in contact with the ground, except under water. The wood, however," he adds, " ought not to be entirely rejected;" and he recommends it as linings for stone-carts and wheelbarrows, that are in constant use; " because, being soft, though it may bruise, it does not split by the stones being tumbled in." It makes better weather-boards than elm or beech, because it does not warp or cast. (*Dendrol.*, p. 55.) Alder hop-poles, according to Cobbett, will only last one year. As fuel, the alder is to the beech as 985 is to 1540: but, like other woods of little value as fuel for heating dwelling-houses, it is preferred for other purposes, where a slow and not fierce heat is required; such as for heating bakers' ovens, for burning limestone and chalk, for burning bricks, &c. The charcoal is esteemed excellent for making gunpowder; but for domestic uses it is considered inferior, being to that of the beech as 885 is to 1600. The ashes yield at the rate of 65 lb. of potash to 1000 lb. of ashes; which ranks it among 73 other woods that yield this salt, in the 67th degree. The bark on the young wood is powerfully astringent, and is employed by tanners: and the young shoots are used both for tanning, and dyeing red, brown, and yellow; and, in combination with copperas, to dye black. The catkins dye green; and the female catkins are used by fishermen to sustain their nets above water, instead of cork. In Hall's *Travels in Scotland*, the author says that the country people in the Highlands make their own shoes; and, to avoid the tax on leather, privately tan the hides with the bark of birch and alder. (*Travels in Scotland*, vol. ii. p. 401.) The fresh wood dyes a snuff-colour; and the bark, dried and powdered, and mixed with logwood, bismuth, &c., yields the colour called *boue de Paris*. It is said that the Laplanders masticate the bark, and, with the saliva so coloured, stain their leathern garments red. (*Syl. Sketches*, p. 9.) In France, the small roots are split, and worked into baskets; and the knotty parts of the larger roots are used for inlaying cabinet-work. Both linen and woollen cloths are dyed black by boiling them with the flowers, buds, female catkins, bark, and spray, and afterwards putting them into water which has been used at a smith's forge for quenching the red-hot iron. The leaves are used in medicine as detersive; and they are employed in decoctions and gargles for diseases of the throat. Among the uses which may be considered obsolete, are two mentioned by Pennant; viz. spreading the boughs over the fields during summer; leaving them there during the winter to rot; and, in the following March, clearing off the undecayed parts, and ploughing the ground for a crop of corn. The other use is that of strewing the leaves and young shoots on the floors of houses to attract fleas, which are said to be entangled in the " tenacious liquor, as birds are by birdlime."

The alder is planted to form hedges in moist meadows; and it is planted along the margins of rivers, to keep up the banks by its numerous creeping roots. If the alder be planted in a low meadow, it is said that the surface of the ground surrounding it will become boggy; whereas, if ash be planted, the roots of which also extend a great way in every direction, and run near the surface, the ground will become firm and dry; though on what principle these changes take place, we are not informed; and the statement is therefore, most probably, a vulgar error. The chief use of the alder is as coppice-wood, to be cut down every five or six years, and made into charcoal for the gunpowder manufacturers. The charcoal is considered the next best for that purpose to that of *Rhámnus Frángula*, the berry-bearing alder, the *aune noir* of the French (see p. 537.); and plantations of the common alder are made by the proprietors of the gunpowder manufactories of Hounslow, and other places, in order to make sure of a supply. The larger branches are made into charcoal for the coarser kinds of gunpowder, and the spray for the finer kinds.

As an ornamental tree, much cannot be said in favour of the alder. Du Hamel remarks that its verdure is agreeable, and its shade dense; and that its leaves, like those on all plants which grow by water, remain on longer in the autumn than those of deciduous trees which prefer dry situations. In sheltered places, young alder trees frequently retain their leaves till January. Du Hamel observes that, as cattle will never touch the leaves of the alder as long as they can get anything else to eat, it is a good tree for parks, and also for hedges; and he adds that it will form very good avenues in situations exposed to cattle. As an object for the landscape-painter, the leaves of the alder do not fall into fine masses; and they appear too uniformly distributed over the entire head of the tree. Nevertheless, as Gilpin observes, it is a more picturesque tree than the common willow, both in its ramification, and in its foliage: perhaps, indeed, he says, it is the most picturesque of any of the aquatic tribe, except the weeping willow. "He who would see the alder in perfection, must follow the banks of the Mole, in Surrey, through the sweet vales of Dorking and Mickleham, into the groves of Esher. The Mole, indeed, is far from being a beautiful river: it is a quiet and sluggish stream; but what beauty it has, it owes greatly to the alder, which every where fringes its meadows, and, in many places, forms very pleasing scenes, especially in the vale between Box Hill and the high grounds of Norbury Park. Some of the largest alders we have in England grow in the Bishop of Durham's park, at Bishop-Auckland. The generality of trees acquire picturesque beauty by age: but it is not often that they are suffered to attain this picturesque period. Some use is commonly found for them long before that time. The oak falls for the greater purposes of man; and the alder is ready to supply a variety of his smaller wants. An old tree, therefore, of any kind, is a curiosity; and even an alder, such as those at Bishop-Auckland, when dignified by age, makes a respectable figure." (*Gilp. For. Scen.*, i. p. 69.) Sir Thomas Dick Lauder fully agrees with Mr. Gilpin in his commendation of the alder. It is always associated in our minds, he says, "with river scenery, both of that tranquil description most frequently to be met with in the vales of England, and with that of a wilder and more stirring cast, which is to be found among the glens and deep ravines of Scotland. In very many instances, we have seen it put on so much of the bold resolute character of the oak, that it might have been mistaken for that tree, but for the intense depth of its green hue. The Mole may, doubtless, furnish the traveller with very beautiful specimens of the alder, as it may also furnish an example of that species of quiet English scenery we have alluded to; but we venture to assert, that no where will the tree be found in greater perfection than on the wild banks of the river Findhorn, and its tributary streams, where scenery of the most romantic description every where occurs." (*Laud. Gilp.*, i. p. 136.) The alder, Boutcher characterises as "an ugly melancholy tree;" and, as it is more frequently found by stagnant than by running water, an observation as old as the time of Virgil, we are strongly inclined, though we do not think it ugly, to consider it as one of

the most melancholy of deciduous trees. The loose negligent manner in which its dark dull green leaves are distributed over its branches, gives the tree a dishevelled appearance, as if it were careless about itself; and, if the weeping willow is to be considered as representing outward and simulated grief, the alder, we should say, forms a good emblem of the grief of the heart.

> "O'er the swift waters of the running stream
> The willow waves its light and graceful form,
> Mingling a transient shadow with the gleam
> Of the bright sunshine — like a passing storm:
> Emblem of grief, which, elegant, refined,
> Is more of outward show than of the mind.
>
> O'er the dark pond, whose sullen bosom shows
> No curling waves to greet the passing breeze,
> The rigid alder its stiff image throws,
> Gloomy and sad, as though it scorn'd to please:
> Emblem of woe, too great to be express'd,
> Which broods in silence, and corrodes the breast."

The motion of the alder tree corresponds with its form; being slight and partial, owing to its rigidity, and not graceful and extending to the whole tree, like that of the willows and Lombardy poplars. Let the reader only imagine a pond with its margin varied by alders, and the same pond varied by willows; and then reflect on the difference in the impressions which the change of each makes upon his mind. The common alder can never, with propriety, be planted in artificial scenery, where the object is to imitate nature in an artistical manner, or, in other words, so as to preserve the character of art. The reason is, the alder is so well known as an indigenous tree, that the artificial scenery in which it appears is immediately lowered to a fac-simile imitation of, or identification with, nature. Where either the geometrical or any other gardenesque method of planting is adopted, however, this principle does not apply; nor will it hold good in the case of planting any of the more striking varieties of the species; for example, the cut-leaved alder, which forms a very interesting tree, and is very fit for planting in artificial scenery, because it is never found wild in Britain, and, from its habit of growth, as well as from the form of its leaves, is in no danger of ever being mistaken foı the common alder.

Poetical and mythological Allusions. Homer, Virgil, and other poets of antiquity, frequently mention the alder. Homer often alludes to it in his descriptions of scenery: —

> ——— "From out the cover'd rock,
> In living rills a gushing fountain broke:
> Around it and above, for ever green,
> The bushy alders form'd a shady scene." *Odyssey*, book ix.

And again: —

> "Where silver alders, in high arches twined,
> Drink the cool stream, and tremble in the wind." *Ibid.*, book xvii.

Some poets, when treating of the fable of the Heliades, assert that the sisters of Phaethon were turned into alders instead of poplars. Virgil, in one his *Eclogues* says, —

> "The sisters, mourning for their brother's loss,
> Their bodies hid in bark, and furr'd with moss,
> How each a rising alder now appears,
> And o'er the Po distils her gummy tears." DRYDEN'S *Virgil*, ecl. vi.

Cowley has adopted the same fable: —

> "The Phaethonian alder next took place:
> Still sensible of the burnt youth's disgrace,
> She loves the purling streams, and often laves
> Beneath the floods, and wantons with the waves." *Plants*, book v.

Virgil, in another passage, alludes to the bark of the alder being full of clefts: —

> "As alders in the spring their boles extend,
> And heave so fiercely, that their bark they rend."
> DRYDEN'S *Virgil*, ecl. x.

The alder, it has been already mentioned, was used by the ancients for boats; and Professor Martyn suggests that a hollow alder, falling into the stream on the banks of which it grew, may have given the first idea of a boat to man. Virgil and Lucan both mention this use of the tree. Among the old English poets, Browne alludes to the shade of the alder not injuring the grass that grows under it: —

> "The alder, whose fat shadow nourisheth,
> Each plant set neere to him long flourisheth."

And Spenser speaks of the alders on the banks of the Mulla, in his *Colin Clout's come home again.*

> "'One day,' quoth he, 'I sate, as was my trade,
> Under the foot of Mole, that mountain hoar,
> Keeping my sheep among the cooly shade
> Of the green alders on the Mulla's shore.'"

Soil and Situation. It was commonly recommended to plant the alder in swamps; and, doubtless, from its roots running near the surface, it will thrive better in such situations than many other trees; but it is a great mistake to suppose that the alder, or any other tree, will either grow rapidly, or attain a large size, except in good soils, liberally supplied with moisture, but by no means at all times soaked with it. A little reflection will convince us that, in all countries, the best soils are on the banks of rivers and lakes; because to such situations the finer earths have been carried down from the higher grounds for ages, whether these grounds have been under water, or exposed to the atmosphere. A good soil, on the margin of stagnant water, the surface of which is some feet below the surface of the ground, promises to be a more favourable situation than either the banks of a river, where the water varies in height at different periods of the year, and where there cannot be a very rich deposition of mud; or a good soil on the margin of water at, or nearly on, the same level with it. This is very well proved by two trees of about the same age: one on the flat banks of the piece of water at Syon, and the other on the raised bank of an old moat at Woburn Farm. The soil, in both cases, is equally rich; but at Syon the main roots of the tree are nearly on a level with the water, while at Woburn Farm the main roots are some feet above it. One of the most favourable situations for growing the alder for poles is, an island the side of which is 2 ft. or 3 ft. above the level of the water. Such islands, when so planted with alders, are called alder beds; as they are called osier holts, when planted with willows. Ten years' growth in such a bed, Cobbett states, will produce poles 20 ft., or more, in length; with but ends of from 4 in. to 6 in. in diameter. The alder, Mr. Sang observes, is found in the highest perfection in moist soils; and, though it will grow freely in light elevated lands, it has a tendency in such situations to dry and impoverish the soil, not being satisfied unless it can obtain abundance of moisture. No tree, he continues, is, perhaps, equally well adapted for upholding the banks of rivers, from the great multiplicity of its roots. Evelyn is of the same opinion; and he, and all authors, agree that it will not even live in dry chalky soil.

Propagation and Culture. Evelyn says that the alder is propagated by truncheons of the stem or of the root, "set as big as the small of one's leg, and in length about 2 ft.;" one end of which should be plunged in the mud. "If we plant smaller sets," he says, "let them be cut at a proper season, and when the wood is of competent bigness, and mature." The Jersey manner of planting truncheons, he adds, is by forming them into lengths of 2 ft. or 3 ft. each, at the beginning of winter; binding them in faggots, and placing the ends of them in water, till towards the end of spring. By that season, they will have contracted a callosity at their lower extremity; and, "being planted, will, like Gennetmoil apple trees, never fail of growing, and striking root." Boutcher says the alder may be propagated by cuttings of three, four, or five years' growth, planted in February or March. The Continental authors mention suckers,

layers, cuttings of the shoots, cuttings of the root, and grafting. Du Hamel says that a large stool or stump of alder, split with a hatchet into five or six pieces, and planted, will form so many trees; and, also, that if, instead of splitting this stool, it be covered over 2 in. or 3 in. deep with soil, it will, in two or three years, throw up shoots, which will become rooted plants. We have planted with success, he says, trees obtained in this way, of 7 ft., 8 ft., and 10 ft. in height, without heading them down; but, in situations exposed to the wind, they require to be cut down to within 5 in. or 6 in. of the surface of the ground. Another mode of multiplying the alder is, to cut a young branch half through at the ground, lay it down horizontally along the surface, and cover it with 2 in. of soil, when almost every bud will produce a shoot, and every shoot will form roots. We have already described this mode as employed for raising plum stocks. (See p. 690.) Notwithstanding these different modes, which are essential for the varieties, all writers agree that the species is best propagated by seeds. When large truncheons are made use of, it would appear that they only succeed satisfactorily in a very moist soil; for a writer in the *Bath Society Papers*, vol. vi. (published in 1792), says, "From the authority of great masters in their way, Miller, Mortimer, &c., I was induced to plant a waggon-load of alder truncheons, in 1764, in boggy places, and along the banks of a river, as directed. I was flattered, the next summer, with every prospect of success, their shoots being strong and gross; but, lo! the year following one and all perished, not having struck a single root." The writer was therefore obliged to replant the ground with rooted slips, taken from old stools, which did very well. The failure may probably have been owing to the second summer being a dry one; and, at all events, it will show the propriety of taking the precaution used in Jersey, when truncheons are employed for propagating this tree.

For raising the alder from seeds, Sang directs the catkins to be gathered in dry weather, as soon as the seeds are matured (which is easily known by the scales beginning to open), and carried to a loft, where they should be spread out thinly. "They are afterwards to be frequently turned, and the seeds will fall out in the act of turning. They are much more ready to drop out, if the loft happen to be placed above an apartment where a good fire is kept. When all the seeds which will readily come out by the above plan have escaped, and are lying on the floor, gather them up into a bag for spring sowing. The cones are then to be thrashed and sifted. Alder seeds may, like those of the birch, be sown from the tree; but, like the birch, the germinating alders are liable to be destroyed by early frosts in the spring." (*Nic. Pl. Kal.*, p. 482.) The proper time of sowing, the same author continues, "is March; and the covering, which ought to be of very light soil, should, on no account, exceed a quarter of an inch in thickness. It being no easy thing to know the quality of alder seed," he observes, "it is better to sow pretty thick, and to thin out the plants, if necessary, the following spring." The seeds are generally collected about the end of October, or the beginning of November. Where the trees overhang water, it is recommended by the Continental authors to cut off the extremities of the branches containing the catkins, and let them drop into the water, afterwards fishing them out with nets. The cones may be kept till spring, if in a perfectly dry situation, and excluded from the air. The seeds may be proyed before sowing, by bruising them on the thumb nail; when, if they have any kernel, it will show a white farinaceous substance, and some appearance of oily or watery matter. All agree that, when sown, the seeds should be very slightly covered with soil. In loamy ground, one sixth part of an inch of light soil strewed over them will be found enough; and in light soils the seeds will be sufficiently covered by a good watering from the rose of a watering-pot; or the operation of covering may be left to the first shower. After the seeds are sown, it is a great advantage, in dry climates, to cover the surface of the bed with pease-haulm, fronds of firs, moss, or loose leaves; or to stretch over it close wicker hurdles, supporting them by props at about 2 in. or 3 in. above the

surface of the soil. Du Hamel obtained abundance of plants by strewing soil over the surface of the ground under a seed-bearing alder tree in autumn, after the seed had dropped. When the seed is sown in autumn, the plants will come up the following spring; and, when it is sown in spring, they will generally come up in the course of five or six weeks after sowing. Spring sowings should be made much thicker than autumnal sowings; because many of the seeds, unless they have been very carefully excluded from the air, lose their vital power during winter. The plants from spring-sown seeds will attain the height of from 3 in. to 6 in. the first summer. The second year they will be double or treble that height; and in three or four years, if properly treated, they will be 5 ft. or 6 ft. high. The nursery culture and after-management in plantations have nothing peculiar in them; except that, when full-grown trees are to be cut down, it is advisable to disbark them a year before; a practice as old as the time of Evelyn. When alders are cut down as coppice-wood, in spring, when the sap is in motion, care should be taken that the cuts are not made later than March; and that they are in a sloping direction upwards. If, at this season, the cuts are made downwards, the section which remains on the stool will be so far fractured as, by the exudation of the sap, and the admission of the weather, no longer to throw up vigorous shoots, and it will decay in a few years.

Accidents, Insects, and Diseases. The alder is liable to few accidents from high winds: but the Adimònia álni *Fab.* deposits its eggs on the young buds; and the larvæ are frequently so abundant, as to consume the leaves almost entirely. There is also a small worm, the caterpillar of some coleopterous insect, which penetrates through the bark into the wood, and ultimately destroys the trees. (*Dict. des Eaux*, &c.) This is probably the Callídium álni *Fab.*, one of the longicorn beetles. A small species of jumping weevil (Orchéstes álni *Leach*) also attacks the leaves, as well as Phyllòbius álni *Fab.*, belonging to the same family, and Galerùca lineòla *Fab.* (the Chrysomèla grísea álni, fem., of De Geer). Amongst lepidopterous insects, Cerùra vínula, Pygæ'ra bucéphala, Notodónta *d*romedàrius, Lophópteryx *c*amelìna, Orgỳia antìqua, Zeuzèra æ'sculi, Porthèsia chrysorrhœ'a, all belonging to the Linnæan *B*ómbyces; Apatèla *l*eporìna, Acronýcta álni and psi (or dagger moths), belonging to the *N*octùidæ; Geomètra ulmària, Drépana falcatària, and several *T*ortrícidæ and *T*inèidæ, feed, in the larva state, upon the alder. Some of these being, however, general feeders, are not so injurious as the others.

Statistics. Recorded Trees. **The finest alder trees which Mitchell ever saw were probably the same as those alluded to by Gilpin (p. 1682.), in the Bishop of Durham's park, at Bishop-Auckland, where a tree, in 1818, had a trunk which measured 11 ft. in circumference. It grew upon a knoll on a swamp. The finest alder poles the same author ever observed were in Arnold's Vale, below Sheffield Place, Sussex:** in 1815, these were from 60 ft. to 70 ft. high. The alders on the banks of the river Findhorn have been already mentioned.

1542



Existing Trees. In England, in the environs of London, at Ham House, Essex, *A.* g. emarginàta is 15 ft. high, the diameter of the trunk 2 ft. 4 in., and of the head 28 ft.; at Syon, *A.* g. laciniàta (*fig.* 1542.) is 63 ft. high, the diameter of the trunk 3 ft., and of the head 63 ft.; at Kenwood, Hampstead, 60 years planted, the species is 60 ft. high, the diameter of the trunk 2 ft. 10 in., and of the head 60 ft. In Devonshire, at Killerton, it is 56 ft. high, with a trunk 3 ft. 3 in. in diameter: in Dorsetshire, at Melbury Park, 100 years planted, the species is 50 ft. high, the diameter of the trunk 3 ft., and of the head 46 ft.; and *A.* g. laciniàta is 50 ft. high: in Somersetshire, at Nettlecombe, the species is 35 ft. high, the diameter of the trunk 2 ft. 10 in., and of the head 32 ft.; in Surrey, at Farnham Castle, 50 years planted, it is 50 ft. high; at Woburn Farm, *A.* g. laciniàta is 70 ft. high, diameter of the trunk 4 ft., and of the head 65 ft.; in Sussex, at Westdean, *A.* g. laciniàta, 12 years planted, is 32 ft. high; in Berkshire, at Bear Wood, 12 years planted, the species is 40 ft. high.; in Buckinghamshire, at Temple House, 40 years planted, it is 50 ft. high; in Cambridgeshire, in the Cambridge Botanic Garden, it is 50 ft. high, the diameter of the trunk 2 ft. 5 in., and of the head 36 ft; in Denbighshire, at Llanbede Hall, it is 54 ft. high, the diameter of the trunk 3 ft., and of the head 34 ft.; in Herefordshire, at Eastnor Castle, 18 years planted, it is 60 ft. high: in Hertfordshire, at Cheshunt, 8 years planted, it is 30 ft. high; and 10 years planted, it is 20 ft. high: in Lancashire, at Latham House, 50 years planted, it is 58 ft. high, the diameter of the trunk 3 ft., and of the head 52 ft.; *A.* g. laciniàta, 20 years planted, is 36 ft. high: in Leicestershire, at Elvaston Castle, the species is 89 ft. high, with a trunk 2 ft. 7 in. in diameter; at Doddington Park, 35 years planted, it is 41 ft. high: in Monmouthshire, at Dowlais House, 12 years planted, it is 35 ft. high; in Northamptonshire, at Wakefield Lodge,

20 years planted, it is 25 ft. high; in Oxfordshire, in the Oxford Botanic Garden, 40 years planted, it is 55 ft. high; in Pembrokeshire, at Stackpole Court, 35 years planted, it is 40 ft. high; in Rutlandshire, at Belvoir Castle, 26 years planted, it is 60 ft. high; in Staffordshire, at Trentham, 20 years planted, it is 20 ft. high: in Suffolk, at Finborough Hall, 60 years planted, it is 70 ft. high, the diameter of the trunk 3½ ft., and of the head 42 ft.; at Ampton Hall, 13 years planted, it is 26 ft. high: in Worcestershire, at Hagley, 11 years planted, it is 16 ft. high; at Coombe Abbey, *A.* g. laciniàta, 40 years planted, is 70 ft. high. In Scotland, in Berwickshire, at the Hirsel, 12 years planted, it is 24 ft. high; in the stewartry of Kirkcudbright, at St. Mary's Isle, 40 years planted, it is 53 ft. high; in Haddingtonshire, at Tynningham, it is 24 ft. high, the diameter of the trunk 16 in., and of the head 36 ft.: in Lanarkshire, in the Glasgow Botanic Garden, 16 years planted, it is 30 ft. high; and *A.* g. laciniàta, 16 years planted, is 35 ft. high: in Argyllshire, at Toward Castle, 12 years planted, it is 23 ft. high; in Banffshire, at Huntley Lodge, it is 63 ft. high, the diameter of the trunk 4 ft. 3 in., and of the head 60 ft.; in Forfarshire, at Monboddo, 34 years planted, it is 30 ft. high; in Perthshire, at Taymouth, it is 30 ft. high, the diameter of the trunk 1 ft. 4 in., and of the head 14 ft.; in Ross-shire, at Brahan Castle, 45 years planted, it is 40 ft. high; in Stirlingshire, at Callender Park, 16 years planted, it is 39 ft. high. In Ireland, near Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 40 ft. high; at Terenure, 15 years planted, it is 20 ft. high. In King's County, at Charleville Forest, 8 years planted, it is 18 ft. high; in Fermanagh, at Florence Court, *A.* g. laciniàta, 40 years planted, is 60 ft. high; in Galway, at Coole, the species is 30 ft. high, the diameter of the trunk 2 ft., and of the head 32 ft.; in Louth, at Oriel Temple, *A.* g. laciniàta, 34 years planted, is 44 ft. high; in Sligo, at Mackree Castle, the species is 60 ft. high, the diameter of the trunk 2 ft., and of the head 36 ft.; in Tyrone, at Baron's Court, 50 years planted, it is 45 ft high. In France, at Nantes, in the nursery of M. De Nerrières, 50 years old, it is 60 ft. high, the diameter of the trunk 1½ ft.; at Avranches, in the Botanic Garden, *A.* g. laciniàta, 20 years old, is 28 ft. high, the diameter of the trunk 9 in., and of the head 16 ft. In Hanover, at Harbcke, 6 years old, it is 8 ft. high, with a trunk 2 in. in diameter. In Austria, at Vienna, in the garden of Baron Loudon, 14 years planted, it is 16 ft. high; at Brück on the Leytha, *A.* g. laciniàta, 24 years old, is 25 ft. high. In Italy, in Lombardy, at Monza, 70 years old, it is 80 ft. high, the diameter of the trunk 1 ft., and of the head 60 ft.

▲ ⚲ 2. *A.* (G) OBLONGA'TA *Willd.* The oblong-*leaved* Alder.

Identification. Willd. Sp. Pl., 4. p. 335.; Baum., p. 20.; N. Du Ham., 2. p. 215.
Synonymes. A'lnus fol. oblong., &c., *Bauh.*; *A.* fol. ovato-lanceol., &c., *Mill. Dict.*, ed. 7.; langliche Else, *Ger.*

Spec. Char., &c. Leaves elliptic, somewhat obtuse, glutinous; axils of the veins naked on the under side. (*Willd. Sp. Pl.*, iv. p. 335.) A large shrub or low tree, said to be a native of Hungary, Austria, and Turkey. It was introduced by Miller, in 1749, who is said to have raised it from seed; and, if so, it must be a tolerably distinct kind; which, indeed, it appears to be, though we are doubtful as to whether it is entitled to rank as a species. The largest plant of *A.* oblongàta that we have heard of is in the Glasnevin Botanic Garden, where, in 1834, after being 30 years planted, it is 30 ft. high; which confirms Willdenow's conjecture, that, in a mild moist climate, it may become a tree. There are plants in the Horticultural Society's Gardens, and at Messrs. Loddiges's.

Variety.

▲ ⚲ A. (*g.*) *o.* 2 *fòliis ellípticis* Ait., *A.* pùmila *Lodd. Cat.*, has the leaves narrower than the species.

⚲ 3. *A.* INCA'NA *Willd.* The hoary-*leaved* Alder.

Identification. Willd. Sp. Pl., 4. p. 335.; Baum., p. 20.; N. Du Ham., 2. p. 215.; Hoss Anleitung, p. 190.
Synonymes. *B.* A'lnus var. incàna *Lin. Sp. Pl.*, 1394.; *B.* incàna *Lin. Supp.*; *A.* fòlio incàno, &c., *Bauh. Pin.*, 428.; *B.* viridis *Vill. Dauph.*, 2. p. 789.; weisse Erle, graue Else, or weisse Eller, *Ger.*
Engravings. Hayne Abbild., t. 136.; and our *fig.* 1543.



1543

Spec. Char., &c. Leaves oblong, acute, pubescent beneath; axils of the veins naked. Stipules lanceolate. (*Willd. Sp. Pl.*, iv. p. 335.) A tree, which grows in light sandy soil, in Lapland, Sweden, and Prussia; and on the hills in Austria, Carniola, the Ukraine, Tyrol, and Switzerland; also in North America. This tree, which Hoss informs us is common on the banks of the Danube, will attain a greater height than the common alder, or from 50 ft. to 70 ft., even in a tolerably dry soil. It differs from the common alder, in the leaves being pointed, in the leaves and the young wood not

being glutinous, in their hoary appearance, and in the absence of tufts of hair in the axils of the nerves of the leaves. It was introduced into England in 1780, but has not been much cultivated. There are plants at Messrs. Loddiges's 30 ft. high. It forms a very handsome tree, and well deserves a place in ornamental plantations.

Varieties.

- ♆ A. *i.* 2 *laciniàta* Lodd. Cat., ed. 1836.—The leaves are slightly laciniated. There are trees in the Horticultural Society's Garden, and at Messrs. Loddiges's.
- ♆ A. *i.* 3 *glaùca*; *A.* glaùca *Michx. N. Amer. Sylv.*, *Lodd. Cat.*, ed. 1836; *Bétula* incàna var. glaùca *Ait.*; Black Alder, *Amer.*, has the leaves dark green above, and glaucous beneath: the petioles are reddish. According to Michaux, this forms a tree, in the United States, from 18 ft. to 20 ft. high. This is one of the most beautiful kinds of the genus.
- ♆ A. *i.* 4 *angulàta* Ait.—Leaves green underneath, with the petioles green.

Other Varieties. A. *americàna* Lodd. Cat., A. *canadénsis* Lodd. Cat., and A. *rùbra* Lodd. Cat., appear to belong to this species; but the plants in the Hackney arboretum are so small, that we have not been able to satisfy ourselves that they are sufficiently distinct to constitute varieties.

■ 4. *A.* SERRULA'TA *Willd.* The saw-*leaved* Alder.

Identification. Willd. Sp. Pl., 4. p. 336.; Baum., p. 21.; N. Du Ham., 2. p. 216.; Pursh Fl. Amer. Sept., 2. p. 623.; Michx. N. Amer. Syl., 2. p. 113.; Lodd. Cat., ed. 1836.
Synonymes. *Bétula* serrulàta *Ait. Hort. Kew.*, 3. p. 338.; *B.* rugòsa *Ehrh. Beitr.*, 3. p. 21.; *Du Roi Harb. Baum.*, 1. p. 176.; *Wang. Amer.*, p. 86.; ? *A.* americàna *Lodd. Cat.*, ed. 1836; ? *A.* canadénsis *Lodd. Cat.*, 1836; common Alder, *Amer.*; Hazel-leaved Alder.
Engravings. Wang. Amer., t. 29. f. 60.; Abbott's Insects, 2. t. 92.; Michx. N. Amer. Syl., t. 75. f. 1.; and our *fig.* 1544., on which are exhibited the larva, pupa, and perfect insect of the *Nóctua* (Acronýcta) hastilifera, *Phalæ'na* hastulifera *Abb. and Smith*, the American alder dagger moth, which inhabits this tree.

Spec. Char., &c. Leaves obovate, acuminate; veins and their axils hairy on the under side. Stipules elliptic, obtuse. (*Willd. Sp. Pl.*, iv. p. 336.) A shrub,

1544



from 6 ft. to 10 ft. high; a native of North America, in swamps and on river sides. According to Michaux, it is frequent along the sides of brooks, but abounds most in places covered with stagnant water. Its leaves are of a beautiful green, about 2 in. long, oval, distinctly furrowed on the surface, and doubly denticulated at the edge. The wood, when cut into, is white;

but, like that of all the alders, it becomes reddish when it comes in contact with the air. The dwarf stature of this, and all the other American alders, renders them of no use as timber trees; but, according to Rafinesque, the leaves are vulnerary and astringent. The bark is styptic, and is used for dyeing brown, and, with vitriol, black. The inner bark of the root is emetic, and dyes yellow. The female catkins also dye black. Plants, in the London nurseries, are from 1*s*. to 1*s*. 6*d*. each; and seeds 1*s*. per oz. At Bollwyller, plants are 1½ franc; at New York, 15 cents.

5. *A*. UNDULA'TA *Willd.* The waved-*leaved* Alder.

Identification. Willd. Sp. Pl., 4. p. 336.; Baum., p. 21.; Lodd. Cat., ed. 1836.
Synonymes. Bétula críspa *Ait. Hort. Kew.*, 3. p. 339.; *B. A'*lnus var. críspa *Michx. Fl. Bor. Amer.* 2. p. 181.; *A.* críspa *Pursh Fl. Amer. Sept.*, 2. p. 623., *N. Du Ham.*, 2. p. 216.

Spec. Char., &c. Leaves oblong, acute, rounded at the base; petioles and veins hairy on the under side; axils of the veins naked; stipules ovate-oblong. (*Willd. Sp. Pl.*, iv. p. 336.) A shrub, not above 3 ft. or 4 ft. high; a native of Canada, and on high mountains in sphagnous swamps in Pennsylvania. In the Berlin Botanic Garden, according to Willdenow, it was 15 ft. high in 1811. Plants, in the London nurseries, are 2*s*. 6*d*. each; and at New York, 20 cents; and seeds 1 dollar and 25 cents per pound.

6. *A*. CORDIFO'LIA *Lodd.* The heart-leaved Alder.

Identification. Lodd. Bot. Cab., t. 1231.
Synonyme. *A.* cordàta *Tenore Prod.*, 54., *Hayne Dend.*, p. 153.
Engravings. Bot. Cab., t. 1231.; our *fig.* 1545.; and the plate of this species in our last Volume.

Spec. Char., &c. Leaves heart-shaped, acuminate, dark green and shining. (*Tenore.*) A tree of similar magnitude to the common alder; a native of Calabria and Naples, in woods. Introduced in 1820, and flowering in March and April, before the developement of the leaves. "A large and very handsome round-headed tree, with broad, deep green, shining leaves, deeply heart-shaped at the base. It grows with rapidity, and is one of the most interesting ornamental trees that have of late years been introduced." (*Penny Cyc.*, art. Alnus.) It is a most distinct species; and, though a native of the kingdom of



1545

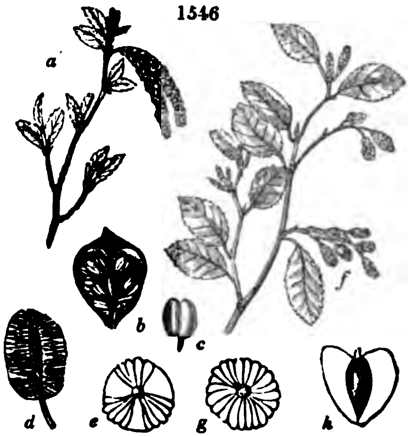
Naples, it is perfectly hardy. It ripens seeds in the climate of London, and might easily be rendered as common as *A.* glutinòsa. There is a very handsome tree in the collection of Messrs. Loddiges; and another in the Horticultural Society's Garden. Plants, in the London nurseries, are 1*s*. 6*d*. each; at Bollwyller, 2 francs; and at New York, 50 cents.

7. *A*. VI'RIDIS *Dec.* The green-*leaved* Alder.

Identification. De Candolle Pl. Fl., 3. p. 304.
Synonymes. *A.* ovàta *Lodd. Bot. Cab.*, t. 1141.; *A'*lnus fruticòsa *Schmidt*; Bétula ovàta *Schrank Sal.*, No. 159.. *Fl. Bav.*, 1. p. 419., as quoted in *N. Du Ham.*, 3. p. 206., *Willd. Sp. Pl.*, p. 465., *Wats. Dend. Brit.*, t. 96., *Host Fl. Aus.* 2. p. 625.; *B. A'*lno-Bétulæ *Ehrh. Beytr.*, 2. p. 72.; *B.* víridis *Hort.*
Engravings. Dend. Brit., t. 96.; Bot. Cab., t. 1141.; Schmidt Œstr. Baum., 3. t. 189.; and our *fig.* 1546., in which *a* is the ament, or male catkin; *b*, the male flower magnified; *c*, the stamen magnified; *d*, a longitudinal section of the cone or female catkin; *e*, and *g*, transverse sections of the cone, to show the position of the scales; *f*, the female catkins; *h*, the samara, or seed, with its wings.

Spec. Char., &c. Leaves ovate, doubly serrated, glabrous. Peduncles of the female catkins branched. Scales of the strobiles having equal lobes, truncate-nerved. (*Willd. Sp. Pl.*, iv. p. 465.) A large shrub, or low bushy tree: a native of the high mountains of Hungary, Styria, and Carinthia; and of Germany, in the neighbourhood of Salzburg. Flowering, in Messrs. Loddiges's collection, in March and April; and ripening its seed in August. It was introduced in 1820. This plant is considered by many botanists as intermediate between the alders and the birches. It agrees with the alders, in having the peduncles of the female catkins ramose; and in general appearance it resembles the *A'*lnus incàna in a young state: but it belongs to the birches, by the parts of its fructification, and by the number of its

1546

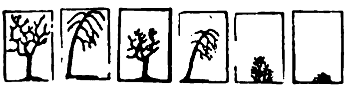


stamens. The stem of the plant, in its native habitat, seldom rises higher than 5 ft. or 6 ft. It divides into smooth branches, angular, furnished with alternate oval leaves, smooth on both surfaces, and doubly serrated. The teeth are sharp, and almost alternately long and short. The male catkins are 2½ in. long, slender, cylindric, with numerous pediceled flowers. The females are subcorymbose, elliptic, with slender peduncles. Watson, who has given a good figure of this species, says, from the habit and inflorescence of the female, this plant may be considered an *A'lnus*; but the fruit, being a samara, "claims it a *Bétula*." As the general appearance of the plant more resembles an alder than a birch, we have placed it under the former genus. It is a very handsome shrub, and is well deserving of a place in collections. There are plants at Messrs. Loddiges's, in the Horticultural Society's Garden, and in some of the nurseries.

App. i. *Other Species of* A'lnus.

The genus *A'lnus*, Mr. Royle informs us in his admirable *Illustrations*, "has the same distribution in the Himalayas that it has in the northern hemisphere; that is, it occurs in moist situations, and along the course of rivers. A. *obtusifòlia* Royle is very abundant on the banks of the Jumna and Tonce. A. *elongàta* Royle occurs in Cashmere; and A. *nepalénsis* Wall. Pl. As. Rar., t. 131., on the mountains surrounding the valley from which it was named." (*Illust.*, p. 341.) It appears probable, that, of the above species, at least A. *nepalénsis*, a tree from 30 ft. to 40 ft. high, may prove sufficiently hardy to bear the climate of London; and we hope it may soon be introduced.

Genus II.



BE'TULA *Tourn.* The Birch. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Tourn., t. 360.; Lin. Gen., 485.; Juss., 409.; Fl. Br., 1011.; Comp., ed. 4, 157.; Lam., t. 760.; Gærtn., t. 90.; Lindl. Nat. Syst. Bot., p.
Synonymes. Bouleau, *Fr.*; Betula, *Ital.*; Abedul, *Span.*; Betulla, *Port.*; Birke, *Ger.*; Berk, *Dutch*; Birk, *Danish and Scotch*; Biörk, or Börk, *Swedish*; Beresa, *Russian*; Brzoza, *Polish*.
Derivations. From *betu*, its Celtic name; or, according to others, from the Latin word *batuere*, to beat; from the fasces of the Roman lictors, which were always made of birch rods, being used to drive back the people. Pliny derives the name from *bitumen*.

Description, &c. The species are chiefly deciduous trees, some of which are of large size; but several of the species are shrubs. They are natives of Europe, chiefly in the most northern parts, or in high elevations in the south; of North America; and some of them of Asia. They are generally found in mountainous rocky situations in the middle of Europe; but they grow wild in plains and peaty soils in the northern regions. The common birch is one of the hardiest of known trees; and there are only one or two other species of ligneous plants which approach so near to the North Pole. The common birch has been known from the earliest ages; and it has long been the most useful tree to the inhabitants of the extreme north of Europe; as the canoe birch has been to those of the north of North America. The species all ripen seeds in the climate of London, and are all of the easiest culture in any ordinary soil; but, being hair-rooted, they do not grow so well in very strong clays; nor do plants of this genus, when raised from layers or cuttings, grow so freely as in the case of some other genera. The leaves of the birch having

little succulency, and being astringent and aromatic, they are very rarely subject to the attacks of insects. The wood of all the species is much less durable than the bark.

Leaves small. Natives chiefly of Europe.

♀ 1. *B.* A'LBA *L.* The white, *or common*, Birch.

Identification. Lin. Sp. Pl., 1393.; Willd., 4. p. 462.; Fl. Br., 1012.; Engl. Fl., 4. p. 153.; Hook. Scot., 274.; Hook. Br. Fl., 3d ed., p. 411.
Synonymes. *B.* pubéscens *Ehrh. Arb.*, 67., *Pl. Off.*, 338.; *B.*, No. 1628., *Hall. Hist.*; *Bétula Raii Syn.*, 445.; *B.* ætnénsis *Rafi.*, according to *Comp. to Bot. Mag.*, 1. p. 91.; Bouleau commun, *Fr.*; gemeine Birke, *Ger.*
Engravings. Eng. Bot., t. 2198.; Fl. Dan., t. 1467.; Trag. Hist., 1113. f.; Bauh. Hist., 1. pt. 2. p. 149. f.; Matth. Valgr., 1. p. 121. f.; Cam. Epit., p. 69. f.; Dod. Pempt., 839. f.; Ger. Emac., p. 1378. f.; Lob. Ic., 2. p. 190. f.; our *fig.* 1547.; and *fig.* 1550., of the entire tree; and the plate of this species in our last Volume.

1547



Spec. Char., &c. Leaves ovate, acute, somewhat deltoid, unequally serrated, nearly glabrous. (*Eng. Fl.*, iv. p. 153.) A tree, a native of almost every part of Europe, but more especially of the colder regions. A diminutive shrub in the extreme north, but a tree from 50 ft. to 60 ft. high in the middle regions; flowering, in Lapland, in May; and in the Apennines, in February and March.

Varieties.

♀ B. *a.* 2 *péndula* Smith, Lodd. Cat., ed. 1836; *B.* péndula *Roth Germ.*, i. p. 405., 2., pt. 2. p. 476.; *B.* verrucòsa *Ehrh. Arb.*, 96., *Lodd. Cat.*, ed. 1836, *Pl. Off.*, 328.; *B.* péndulis vírgulis *Loes. Pruss.*; the weeping Birch, is a well-known tree, differing from the species in having the shoots more slender, smoother, and pendulous. (See the plate of the young tree in our last Volume.) Some Continental and English botanists, and, among the latter, Sir J. E. Smith, are inclined to consider this a variation rather than a variety; but this opinion does not prevail among cultivators. Sang states that the weeping variety is easily known from the common birch, by its attaining a much larger size; by its main branches being more straight and upright (though its lateral ones are pendent at their extremities); and by its leaves being smaller. It attains, he says, the stature of a timber tree in much less time than the common sort; and is far handsomer, both when young and when in a mature state. All these particulars must have been observed by every one who has had much occasion to penetrate into birch forests; and the circumstance of nurserymen collecting the seeds of this variety, and finding that the majority of the plants produced by them are of the smooth-leaved and weeping kind, leaves no doubt in our mind that *B.* a. péndula is as much a variety as *B.* a. pubéscens. Sir W. J. Hooker says (*Brit. Fl.*, 3d ed., p. 411.): "There is a variety of this tree (*B.* péndula *Roth, Lindl. Syn.*, p. 229.), with remarkably drooping branches, which are more verrucose than in the common appearance. It is not unfrequent in the Highlands of Scotland, and is generally known by the name of the drooping birch. To this Scott alludes:

1548



> "'Where weeps the birch with silver bark,
> And long dishevelled hair.'"

♀ B. *a.* 3 *pubéscens*; *B.* pubéscens *Ehrh. Beitr.*, vi. 98., *Willd.*, iv. 462., *Lodd. Cat.*, ed. 1836; and our *fig.* 1548.; has the leaves covered with white hairs; and, though con-

sidered by many botanists as a species, and distinct enough in appearance, we have no hesitation whatever in pronouncing it to be merely a variety.



1549

‡ B. *a*. 4 *póntica*; *B*. póntica *Lodd. Cat.*, ed. 1836; and our *fig*. 1549.; has the leaves somewhat larger than the species, and appears of more robust growth. There is a tree of this kind in the Oxford Botanic Garden, which, 40 years planted, is 45 ft. high; the diameter of the trunk 1 ft. 11 in., and of the head 30 ft. At Croome there is a tree, which, 40 years planted, is 70 ft. high; and in the Glasnevin Botanic Garden, one 35 years old, which is 38 ft. high. The plants in Messrs. Loddiges's collection are quite young, and not above 3 ft. or 4 ft. in height.

‡ B. *a*. 5 *urticifòlia*, *B*. urticifòlia *Lodd. Cat.*, has the leaves deeply laciniated, serrated, and hairy.

‡ B. *a*. 6 *dalecárlica* L. Supp., 416., is described by the younger Linnæus, as having its leaves almost palmate, with the segments toothed; "cut like those of hemp," according to Bosc.

‡ B. *a*. 7 *macrocárpa* Willd. has the female catkins twice as long as those of the species.

‡ B. *a*. 8 *fòliis variegàtis* Dumont has the leaves blotched with yellowish-white.

Other Varieties. *B*. populifòlia and *B*. daùrica, given below as species, are, we think, as much varieties as the preceding sorts; for, though *B*. populifòlia will come tolerably true from seed, yet it is often produced from seeds of the common birch. *B*. daùrica appears to be a variety of *B*. álba, stunted from the climate in which it grows; and the same observation will apply to *B*. sibírica, and some others, enumerated in the *Catalogue* of Messrs. Loddiges for 1836. *B*. excélsa and *B*. nìgra of some of the London gardens are mere varieties of the common birch, and quite distinct from the species described by botanists under these names, which are natives of America. (See *Gard. Mag.*, vol. xi. p. 502. 689.) There are some other sorts in the collection at Messrs. Loddiges's; such as *B*. undulàta, *B*. Thouiniàna and *B*. Fischèrii, which appear to us to belong to *B*. álba; but, the plants being exceedingly small, we are not able to determine this with certainty. *B*. laciniàta being merely a cut-leaved variety of *B*. populifòlia, we have included it under that head; as we have the sort named *B*. péndula, in the collection of the Messrs. Loddiges. We prefer, in this case, as in similar ones, giving varieties which have been generally considered species as such, merely indicating our opinion by a letter in parentheses, for the sake of disposing of the synonymes. There are some varieties of a trifling nature given by Linnæus in his *Flora Suecica:* such as one with a rounder leaf than the species, and pendent branches; one with a white, broad, and acuminate leaf; one with brittle branches, and a blackish woolly leaf; one (*B*. saxátilis torminàlis) with an oblong leaf; and, lastly, the dwarf birch, probably the *B*. pùmila of *Lodd. Cat.* These varieties are recorded in Martyn's *Miller;* but, unless we are right in conjecturing *B*. pùmila to be the last, we have not seen any of them. Dr. Agardh mentions "three singular varieties with laciniated leaves (*B*. hýbrida *Mœnch*) near Fahlun. (*Gard. Mag.*, vol. xii. p. 63.) The birch varies so much from seed, that scarcely any limits can be given to the number of sorts that might be selected from a seed-bed. In extensive birch forests, also, whether in the rocky scenery of Sweden, the bogs in the north of Russia, or on the hills of Germany, full-grown trees may be seen, as various in their foliage and habit of growth as the young plants in seed-beds. For this reason, we are inclined to think that there are only two European species of birch, *B*. álba and *B*. nàna; and four American species, *B*. papyràcea, *B*. excélsa, *B*. lénta, and *B*. nìgra.

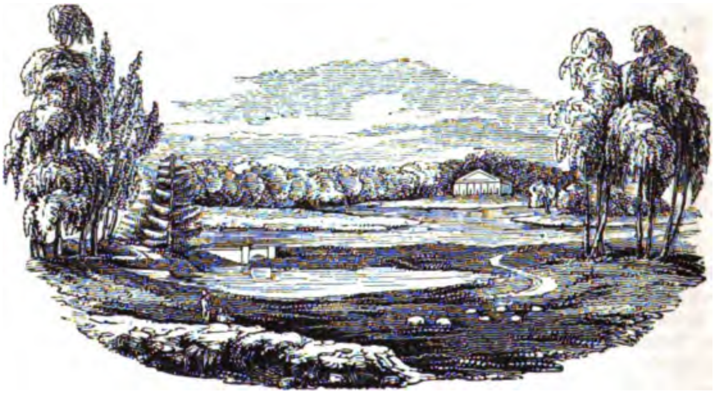
1550



Description. The common birch, when of a tree-like size, is known, at first sight, by the silvery whiteness of its outer bark, the smallness of its leaves in comparison with those of other timber trees, and the lightness and airiness of its whole appearance. The tree, as compared with others, is of the middle size, seldom exceeding 50 feet in height, with a trunk of from 1 ft. to 18 in. in diameter, even in the most favourable situations. When drawn up in woods, however, in good soil, it has been known to attain the height of from 60 ft. to 80 ft., but never, in such situations, with a trunk of proportionate diameter. In the woods of Russia, Pallas observes, the birch is tall and erect, with a trunk not very thick; in the groves, the trunk is thicker, and the head more spreading; and, in the open fields, the trunk is short, the head broader than it is high, and the branches tortuous. The trunk is, in general, straight and cylindrical, without deformities and knots. The cuticle is white and scaly in trees from ten to thirteen years of age; but in old trees the trunk is covered with deep black clefts in its bark. The branches proceed chiefly from the summit, and are alternate, frequently subdivided, very pliant and flexible, and covered with a reddish brown or russet-coloured smooth bark, which, as well as the buds, is slightly impregnated with a resinous substance. Both the trunk and branches are occasionally subject to the production of excrescences; the former as large knots, and the latter as twiggy tufts resembling large birds' nests. These twiggy tufts are seldom found on the weeping variety, and abound most on trees of the common sort growing on boggy soil. They are most probably formed by the extravasation of the sap, occasioned by the puncture of some insect. The leaves are alternate, bright green, smooth, shining beneath, with the veins crossing like the meshes of a net; and the petioles are ½ in. or more in length. The male catkins appear in autumn, on the ends of the twigs, but do not expand their flowers till the female catkins appear in spring. On young trees, and on old trees in particular situations, especially in damp boggy soil, the branches are erect; but in old trees, and in some young ones more than in others, they are pendulous, and hence the variety of that name. The roots extend themselves horizontally, and divide into a great number of rootlets and hair-like fibres at their extremities; but they never throw up suckers. The rate of growth is considerable when the tree is young; averaging from 18 in. to 2 ft. a year for the first 10 years; and young trees cut down to the ground often make shoots 8 ft. or 10 ft. long

in one season. The duration of the birch is not great, the tree attaining maturity, in good soils, in from forty to fifty years; but, according to Hartig, seldom lasting in health till it attains a hundred years.

Geography. The common birch is a native of the colder regions of the old Continent; and also, as we think (under the form of *B. populifòlia*, and other kinds, treated by botanists as species), throughout great part of North America. It is found in Asia, in Siberia, as far as the Altaic Mountains; and also in the Himalayas; but not in Africa. According to Pallas, the birch is more common than any other tree, throughout the whole of the Russian empire; being found in every wood and grove, from the Baltic Sea to the Eastern Ocean; prospering best in a moist alluvial soil (*humoso-limosum*); and, as it loves a moderate humidity, it always indicates land fit for the plough. In some parts of Russia, immense tracts are covered with this tree alone. In the neighbourhood of Moscow, it forms the prevailing tree in all the woods belonging to the country residences of the nobles, and it may be seen in the foreground of *fig*. 1551., which is a view of the Lake of Petrovskoyé, which, in



1814, when we made the sketch, was one of the most celebrated "English pleasure-grounds" in that part of the Russian empire. In Europe, Dr. Agardh observes, the region of the birch is bounded only by vegetation itself. It is found from Iceland to Mount Etna: in the Icelandic forests its limits are only those of vegetation; but on Mount Etna it is not higher than 5600 ft. above the level of the sea, its range being about 1000 ft. It is found on the whole line of the Apennines, in the kingdom of Naples, (where it commences at the height of 4761 ft. above the level of the sea,) and at the height of 6100 ft. forms little woods. (*Comp. Bot. Mag.*, 1. p. 91.) It is also found on most of the high mountains of the south of Europe; on Mount Caucasus, in Bucharia, on the eastern shores of the Caspian Sea; in Kamtschatka, in forests at lat. 58° N.; in Dahuria, in Japan, and in West Greenland. (*Dec.*) Von Buch considers the birch to require a mean temperature of about 26° of Fahr. In Lapland, according to the same author, the line of birches is 1937 ft. below the line of eternal snow, and 802 ft. above the boundary of the Scotch pine. At Hosperdet, in a bay of the Icy Sea, the common birch is a low bush; but at Alten it becomes a lofty tree, forming woods. (*Schouw* in *Gard. Mag.*, vol. xii. p. 60.) On the Alps, in Switzerland, it is never found at above the height of 4400 ft. (*M. Alphonse De Candolle* in *Gard. Mag.*, vol. xii. p. 234.) *B. álba* appears in North America under the form of *B. populifòlia*, which, though by many botanists considered as a distinct species, yet we cannot help thinking is nothing more than a very distinct variety of the birch of Europe. (See No. 2.) *B. pùmila* and *B. glandulòsa*, also found in North America, are, probably, nothing more than varieties of *B. álba*. In Britain and Ireland, it is found almost every where on mountains and in poor sandy soils; reaching

to the height of 3500 ft. on some of the Highland mountains. According to Dr. Walker, the birch grows higher on the Highland mountains than any other tree except the mountain ash: but in this he must have been mistaken; because the extreme height at which the mountain ash is found in Forfarshire is, according to Watson, 2500 ft.; and the birch is found, in various places, 1000 ft. higher up the mountains. Some of the finest specimens of the weeping birch grow on the banks of rocky streams in North Wales. In England, the birch is supposed to have been once so plentiful in Berkshire as to have given the name to that county; though some suppose the name Berkshire to be a corruption of Bare-oak, or Berroc, shire.

History. The common birch was known to the Greeks (see p. 18.) and to the Romans. According to Pliny and Plutarch, the celebrated books which Numa Pompilius composed 700 years before Christ, and which were buried with him on Mount Janiculum, were written on the bark of the birch tree. In the early days of Rome, the lictors had their fasces made of birch branches, which they carried before the magistrates to clear the way, beating the people back with the boughs. Pliny says that the birch was brought to Italy from Gaul; though, considering that it is a native of the Apennines, it is surprising that it should not have been known to the Romans as an indigenous tree. The birch was formerly used in England for ornamenting the houses during Rogation Week, in the same manner as holly is at Christmas. Gerard says the branches of the birch "serve well to the decking up of houses and banquetting roomes for places of pleasure, and beautifying the streetes in the Crosse, or Gang, Week, and such like." The Cross, or Gang, Week, Phillips tells us, was the same as Rogation Week; which was called Gang Week from the crowds, or gangs, of penitents going in that week to confession, before Whitsuntide. It was called Cross Week, from the crosses carried before the priests in the procession on Ascension Day; and Rogation Week, from the Latin verb *rogo*, to ask or pray. (*Syl. Flor.*, i. p. 133.) Coles, writing in 1657, observes that, at this season, as he "rid through little Brickhill, in Buckinghamshire, every sign poste in the towne was bedecked with green birch." We have observed the same custom in Poland, at the same season; where, also, large boughs are fixed in the ground, against each side of the doors of the houses. The birch has been used as an instrument of correction at schools from the earliest ages Anciently, says Evelyn, "birch cudgels were used by the lictors, as now the gentler rods by our tyrannical pedagogues, for lighter faults." The sight of a birch tree, observes the writer of the article Birch in the *Nouveau Du Hamel*, "offers a vast subject of interesting meditation: but happy the man to whom its flexible pendent branches do not recall to mind that they were formerly instruments of punishment to him!" Gerard observes that, in his time, "schoolmasters and parents do terrify their children with rods made of birch." The use of these rods, however, both in schools and private families, is now fast passing away, together with many other barbarous practices of our ancestors. At present, the tree is planted in Britain in poor soils, and in exposed situations, for sheltering others; in copses, for producing brooms, and for many other valuable purposes; and, in favourable soils and situations, as being ornamental. On the Continent, and more especially in France and Germany, it is extensively planted as a fuel tree, on the poorest soils; and, in good soils, as a nurse for hard-wooded and resinous trees. In the north of Russia, and in Sweden and Norway, the natural woods of birch form the principal supplies of fuel for large towns; and, in many places, also the principal timber for buildings, furniture, and rural implements.

Properties and Uses. Naturally, the birch forms the food of various insects, when in leaf; and the buds and catkins, in the winter season, are eaten by numerous birds. The siskin, or aberdevine (*Fringílla Spìnus L.*), feeds upon the seeds, which are its favourite food. The tree, when old, forms the habitat of various lichens, mosses, and fungi; particularly Dædàlea *betùlina*, and the fungus (Polýporus fomentàrius) that produces the moxa. The leaves and young shoots are also occasionally eaten by cattle, sheep, and swine, though they are not fond

of them. Artificially, the birch recommends itself to the proprietor of woods and to planters, by the following qualities:—1st, By the lightness and multiplicity of its seeds, which it begins to produce at the age of six years; and which, being spread abroad on every side by the wind, give rise to a great number of young plants; thus producing a thick wood, without either care or labour. 2dly, By the rapidity of its growth, and the resistance which it makes to all the circumstances which usually destroy trees, and eradicate woods. 3dly, By its power of withstanding a great degree of both heat and cold. 4thly, By its suffering little from the bite of cattle, and being but seldom attacked by caterpillars, which are said only to have recourse to it after they have destroyed all the succulent leaves in the same forest; and which, consequently, being then nearly matured, can do it but little harm. 5thly, By its not requiring the shade or protection of other trees; while its own shade, from the lightness and thinness of its foliage, is extremely favourable to the growth of oaks, beeches, and, above all, the pine and fir tribe, which spring up under its protection with great vigour. Hence, the value of the birch as a nurse to hard-wooded trees, which it protects in their youth, but which destroy it when they acquire strength. 6thly, By its not injuring other trees with its roots, which run along the surface of the soil, and draw but very little nourishment from it. 7thly, By its succeeding almost every where, and improving poor soils by the deposition of its leaves. 8thly, By its furnishing useful products, such as spray for brooms, &c., a very short time after being planted. And, 9thly, by its producing a wood almost exclusively employed in Sweden, and other parts of the Continent, for smelting-furnaces; and in other cases where a bright clear flame is required. Though all these advantages, says the author of the article Bouleau, in the *Dictionnaire des Eaux et Forêts*, belong to the birch, we cannot place it in the first rank of forest trees; and the oak, the beech, and other trees of stately growth, are to be preferred to it in good soils: but the birch cannot be too strongly recommended for light and poor soils, sands, and chalks. In Prussia, he adds, the birch is planted every where; and it is considered to afford security against a dearth of fuel, and to insure the prosperity of the woods, by the dissemination of its seeds, which fill up every blank that occurs.

The wood of the birch is white, shaded with red; of a medium durability in temperate climates, but lasting a long time when it is grown in the extreme north. The grain of the wood is intermediate between coarse and fine. It is easily worked while it is green; but it chips under the tool when dry. It weighs, when green, 65 lb. 6 oz.; half-dry, 56 lb. 6 oz.; and dry, 45 lb. 1 oz. The wood of old birch trees is harder than that of young trees, and it also weighs considerably more: for it appears, by the experiments of Hartig, that the wood of a tree of 60 years' growth, weighed, dry, 36 lb. 13 oz.; while that of a tree of 25 years' growth, in the same state of dryness, only weighed 35 lb. 5 oz. The wood soon rots when laid on the ground in heaps; and, therefore, immediately after the trees are felled, they ought to be drawn out of the wood, and taken into the timber-yard, where they can be exposed freely to the air. As fuel, birch wood occupies the 12th place among 21 different sorts; and is to the fuel of the beech as 13 is to 15: but, if the wood of the birch is to be compared with that of the beech, taken in the bulk, it is only as 12 to 15; because birch logs, not being so straight as those of the beech, do not pack so closely together. The wood gives a clear, bright, and ardent flame, and affords the kind of fuel most generally used in Sweden, Russia, and France, for smelting-furnaces. Its charcoal remains burning a long time; though, compared with that of the beech, its value is only as 14½ to 16. The bark of the birch is remarkable for its durability, remaining uncorrupted for ages, even in situations exposed alternately to air and water, cold and moisture. Pallas refers, in proof of this, to the tombs near Jenisca, in Siberia; and to the vaults under the Kremlin, in Moscow. When Maupertuis travelled through Lapland, "to measure a degree of latitude, he was obliged to pass through vast forests, consisting entirely of birch. The soil, in some parts of these wastes, being very shallow, or very loose, the trees had

not a sufficient footing for their roots, and became an easy prey to winds. In these places, Maupertuis found as many trees blown down as standing. He examined several of them, and was surprised to see that, in such as had lain long, the substance of the wood was entirely gone, but the bark remained a hollow trunk, without any signs of decay" (*Gilpin's Forest Scenery*, vol. i. p. 71.) In the mines of Dworetzkoi, in Siberia, a piece of birch wood was found changed entirely into stone; while the epidermis of the bark, of a satiny whiteness, and shining, was exactly in its natural state, perfectly well preserved, and without being coloured by the iron. It would be difficult, says the relater of this fact in the *Nouveau Du Hamel*, to find a more striking proof of the durability of this thin pellicle, so light and so delicate in appearance, and which the ancients used with so much propriety instead of paper, before the invention of that material. The buds and leaves, in early spring, abound in a resinous matter, an aromatic and agreeable fragrance from which may be perceived at a considerable distance from the tree; and the leaves, when bruised, whether in a recent or dried state, are also bitter and aromatic. The wood is employed by wheelwrights, in France, for the felloes of wheels; and, in the interior of Russia, in the construction of small rustic carriages: the felloes of the wheels are sometimes made of one entire stem of a young birch tree, bent by heat, and retained in its place by ties of the spray. On the Continent, chairs, and many kinds of furniture, are made of birch wood; and many articles of cooperage, turnery, &c. Sabots are also made of it; but they are not so good as those made of alder, and several other kinds of wood, admitting the water when they grow old. For cabinet-making, the birch is of little use till it has attained the age of sixty or eighty years; at which age it is little liable to warp, or to be attacked by worms. The tree occasionally produces knots of a reddish tinge, marbled, light, and solid, but not fibrous; and of these, which are much sought after by turners, cups and bowls are made by the Laplanders with their knives. The young shoots and branches make hoops, brooms or besoms, and ties for faggots, baskets, wicker hurdles, and other purposes to which the hazel or the basket-willow is applied; and, when peeled, are used for making whisks for frothing up syllabubs, creams, and chocolate. Birch hoops are very durable, from the conservative influence of the bark.

In Poland, Russia, Sweden, Norway, and Lapland, small bundles of the twigs, which have been gathered in summer, and dried with the leaves on, are used in the vapour-baths, by the bathers, for beating one another's backs, in order to promote perspiration. The inhabitants of the Alps make torches of the branches; and the Highlanders, candles of the bark, twisted into a rope-like form. Sandals are also made of it, and thin pieces of the epidermis are placed between the soles of shoes, or in the crown of the hat, as a defence against humidity. The bark is used as coping to walls, and is placed over the masonry of vaults under ground, as lead is in England, to prevent the moisture from the soil from penetrating through it. It is even wrapped round sills and the lower parts of posts, and other pieces of wood inserted in the ground, or resting on it, to preserve them from decay. The charcoal of the birch is much in demand for making gunpowder, and for crayons. The leaves are bitter to the taste, and not willingly eaten by any animals, except rabbits and goats; but, when they are young and fresh, they may be given to cattle and sheep; and they are dried for this purpose throughout a great part of Sweden, Norway, and Lapland. Medicinally, the leaves are said to be resolvent and detersive; and it is added, that persons afflicted with rheumatism, sleeping on a bed stuffed with birch leaves, experience a perspiration which affords them great relief. A yellow colour is obtained from them, which is used for painting in distemper, and for dyeing wool. The buds and the catkins afford a kind of wax, analogous to that of bees. The ashes are rich in potash: 1000 lb. weight of wood, burnt green, will give 10 lb. 12 oz. of ashes, which will afford 1 lb. 4 oz. of potash. In this respect, the birch occupies the 55th place in a list of 73 trees. In the birch, as in all other trees, the potash is most abun-

dant in the bark; and, consequently, the spray always yields more in proportion than the trunk. The bark is much employed for tanning leather, both in Britain and on the Continent. The birch appears to have been first used in England for this purpose in Evelyn's time, as he speaks of "Mr. Howard's new tan, made of the tops and loppings of birch." The bark yields a yellowish brown dye, and, combined with alum, a brownish red. These may be considered as the principal uses of the birch tree in central Europe; but there are others to be noticed, which are peculiar to Norway, Lapland, Russia, and the Highlands of Scotland.

In Lapland and Kamtschatka, the huts are constructed with birch branches covered with turf; and faggots of the spray with the leaves on, in cases formed of the skins of reindeer, serve for seats during the day, and beds at night. An interesting view of some of these huts is given by Dr. Clarke in his *Scandinavia*, of which our *fig.* 1552. is a copy. The bark of large trees, cut into lengths of 3 ft., and about 18 in. or 2 ft. broad, serves the Laplanders as a species of cape, or cloak, a hole being made it, in the centre, to admit the head. Sometimes several pieces are used, with the holes only at one end; and these, put over the head, and hanging down on every side, form as complete a protection from perpendicular rains or snows as if the man were slated. The same people, and also the Russians, make the bark of the smaller trees into boots and shoes; the legs of the boots being taken from trees about the same thickness as the human legs, and, consequently, having no seam. The bark is also made into baskets, boxes, mats, and cordage for harnessing horses and reindeer, and the inner bark into thread; while all the fragments are carefully preserved for lighting fires, or twisting into candles. Reindeer skins are tanned by steeping them in a decoction of birch spray, mixed with salt; and woollen stuffs, being boiled in the same decoction, without the salt, are dyed yellow or yellowish brown, according to the length of time which the process is continued. The Finlanders use the dried leaves as tea. The bark is also extensively used, in Sweden and Norway, in roofing houses. The rafters are first covered with boards, on which plates of birch bark are laid in the same way as slates are in England; and the whole is covered with turf and earth, to the depth of 1 ft. or more, to exclude the heat in summer, and the cold in winter. The earth over the bark is sometimes cultivated; though it is most commonly kept under grass. Dr. Clarke mentions that, "on some of the roofs of the Norwegian cottages, after the hay was taken, he found lambs pasturing; and on one house he saw an excellent crop of turnips." (See *Encyc. of Agri.*, ed. 2., p. 111.) In Kamtschatka, the inner bark is dried and ground, like that of the Scotch pine, in order to mix it with oatmeal, in times of scarcity. It is also said to be eaten in small pieces along with the roe of fish. The sap of the birch is made into beer, wine, and vinegar; and a sugar is extracted, and a spirit distilled, from it: 240 bottles of sap give 6 lb. of syrup, which is used in Russia in that state as sugar, without being crystallised. "During the siege of Hamburg by the Russians, in 1814, almost all the birch trees in the neighbourhood were destroyed by the Boshkirs, and other barbarian soldiers in the Russian service, by being tapped for their sap." (*Penny Cyclo.*, art. Betula, vol. iv. p. 348.) The beer is produced by fermenting the sap with yeast, hot water, and hops, in the usual manner. The sugar is procured by boiling and evaporation; and the wine is made as follows: —

1552



Birch Wine. The sap is first obtained by boring a hole, 1 in. or 2 in. deep, in each tree, near the

ground, and on the south side of the trunk. In England, several holes are sometimes bored in the same tree at once; but, in France, this method is thought to deprive the tree of its sap too suddenly. Each hole should have a kind of fosset fixed in it, which may be made of a piece of elder wood, with the pith scooped out, or of a large quill. The outer end of this tube is placed in a vessel or large bladder, to reserve the sap. In some places, the collectors of the sap cut off the extremity of each branch, tying a bladder or vessel to the end of the wounded part. When a sufficient quantity of sap has been collected, the hole in the tree is stopped with a wooden peg; or the end of the wounded branch is covered with pitch. This operation is always performed in spring; and most sap is said to be procured after a very severe winter. Several trees should be bored at the same time, in order that a sufficient quantity of sap may be obtained in one day, as it is spoiled by being kept. It has been observed that the sap flows in greatest abundance about noon. When the wine is to be made, the sap should be boiled with moist sugar or honey, in the proportion of four pounds of sugar to every gallon of liquor. While boiling, the scum is taken off as fast as it rises, till the liquor is quite clear. It is then worked with yeast in the usual way. The juice and rind (pared very thin) of a lemon, and of a Seville orange, may be added to every gallon of clear liquor, and will be found a great improvement. Some persons also put a few twigs of sweet briar into the cask when the wine is tunned, to give it a perfumed flavour; and anciently it was the custom to put cinnamon and other spices into this wine. In Moscow, they add dried sprigs of mint. The wine should be kept three months before it is bottled, and twelve months before it is drunk. Birch wine has an agreeable flavour, and is considered very wholesome. That made in Russia effervesces like champagne.

Birch Oil is obtained from the bark, by a kind of distillation, which is thus effected: — An excavation is made in the soil, on the side of a bank 10 ft. or 12 ft. deep, and in the form of an inverted cone, like a common limekiln, which is lined in the inside with clay. The bark, being collected, and placed in the kiln, is covered with turf, and then ignited: the oil flows through a hole made in the bottom of the kiln, into a vessel placed to receive it, from which it is transferred to casks for exportation. The liquor produced consists of oil and pyroligneous acid, and is used for tanning hides, to which it gives that powerful fragrance, so well known as peculiar to Russia leather. The oil, when purified, is quite clear, and is used in medicine, both internally and externally; and the pyroligneous tar-like liquor, which is separated from it, is used for greasing wheels, and for other purposes.

In the Highlands of Scotland, Sang observes, birch may be said to be the universal wood. "The Highlanders make every thing of it: they build their houses of it; make their beds, chairs, tables, dishes, and spoons of it; construct their mills of it; make their carts, ploughs, harrows, gates, and fences of it; and even manufacture ropes of it." (*Pl. Kal.*, p. 80.) The branches are employed as fuel in the distillation of whisky; and they are found to contribute a flavour to it far superior to that produced by the use of fir-wood, coal, or peat. Birch spray is also used for smoking hams and herrings, for which last purpose it is preferred to every other kind of wood. The bark is used for tanning leather, dyeing yellow, making ropes, and sometimes, as in Lapland, instead of candles. The spray is used for thatching houses; and, dried in summer with the leaves on, it makes an excellent material for sleeping upon, where heath is scarce. The wood was formerly used in the Highlands for arrows; and the bark, it is said, on the sea coast, for making boats, as that of *B.* papyràcea is in North America.

In addition to the above, we might enumerate a number of minor uses mentioned by authors, when speaking of the tree as belonging to the most northern parts of Europe; and some of which, we have reason to believe, are now become obsolete. Among these are what Evelyn calls "the whitest part of the old wood, found commonly in doating birches," from which, he says, is made "the ground of our effeminate-formed gallants' sweet powder;" and of the quite consumed and rotten wood," he says, is "gotten the best mould for the raising of divers seedlings of the best plants and flowers." (*Hunter's Evelyn*, vol. i. p. 224.) The use of the birch in artificial plantations, in Britain, is chiefly as an undergrowth, and as coppice-wood. In both cases, it is cut, every 5 or 6 years, for brooms, hoops, wattle-rods, crateware, &c.; every 10 or 12 years, for faggot-wood, poles, fencing, and bark for the tanners, the value of which, in Scotland, is about half that of oak bark; and not oftener than once in every 15 or 20 years, when it is wanted for herring casks. In all these cases, the spray is used for besoms, rods, ties, and similar purposes. In the Highland districts, standard trees are left to attain a timber size. The birch, as already observed, is very frequently used as a nurse to other trees; and especially to the oak, the chestnut, and other hard woods. Many of the extensive oak plantations made by the late Duke of Portland in Nottinghamshire were raised between rows of birch trees, planted two or three years before the acorns were sown; as has been recorded in detail by Speechly, and by Hunter in his edition of Evelyn's *Sylva*, and in his *Georgical Essays*. Hedges are, also, frequently made of the birch in poor, mossy, or sandy soils; the tree bearing the shears as well as any ligneous plant whatever.

The birch, in landscape-gardening, is an interesting tree, from its form, and

from the whiteness of its bark, which renders it more conspicuous in winter than in summer. Its stem, as Gilpin observes, "is generally marked with brown, yellow, and silvery touches, which are peculiarly picturesque, as they are characteristic objects of imitation for the pencil, and as they contrast agreeably with the dark green hue of the foliage. But only the stem and larger branches have this varied colouring. The spray is of a deep brown, which is the colour, too, of the larger branches where the external rind is peeled off. As the birch grows old, its bark becomes rough and furrowed: it loses all its varied tints, and assumes a uniform ferruginous hue." (*Forest Scenery*, vol. i. p. 70.) The weeping variety, which, Gilpin says, is sometimes called the lady birch, from "its spray being slender, and longer than that of the common sort, forms an elegant, pensile foliage, like that of the weeping willow; and, like it, is put in motion by the least breath of air. When agitated, it is well adapted to characterise a storm, or to perform any office in landscape which is expected from the weeping willow." (*Ibid.*)

The birch, however, being an extremely common tree in various districts, and never being suffered to grow in any quantity, in its native countries, in those soils and situations where other trees will thrive, there are certain associations connected with it which are unfavourable to its use in gardenesque scenery. Nevertheless, it must be allowed that these associations can only be experienced by those who have seen the tree in its native habitats. Natives of Scotland, North Wales, Sweden, Russia, and Germany would regard the birch as indicating poor, sandy, boggy, or rocky soil; and would not place it on a lawn; from the same feelings that would prevent a London planter from placing there the alder, or any of the common willows. In the gardenesque style, therefore, or in that species of picturesque which is an imitation of nature, and not an identification of her scenery, the birch, in most parts of Europe, would require to be planted in situations where it would not be conspicuous; and never where it would form a leading feature in any general view. The same principle applies in the case of every indigenous tree; and with a force proportionate to the commonness of that tree in the country where the gardenesque plantation is to be made. A residence planted in a style truly gardenesque ought, as we have often observed, to have no indigenous trees in it whatever.

Where plantations are to be made in the elegant or artistical picturesque style, and which are intended to form scenes which will be considered by painters as equally worthy of their study with picturesque natural scenery, and yet never for a moment be mistaken for it, the introduction of the birch must be guided by exactly the same principles as in the gardenesque. It must never be planted in small groups, but always in groups of such a size as to be only seen in association with other trees. The exceptions to this last rule are, situations at a distance from scenery where the birch is indigenous; and these may be considered as occurring in all fertile valleys and plains. However beautiful the birch tree may be in itself, and especially when it assumes the weeping form, it would be inconsistent with sound principles to plant it on lawns either in North Wales or the Highlands of Scotland; though in the neighbourhood of London, and many parts of England, it may be justly admitted, even on lawns, as one of the most elegant of our ornamental trees.

Where the common birch is so favourite a tree as to make it desired in considerable numbers, the only mode of introducing it into artificial scenery in countries where it abounds, is by planting it in avenues, or in geometrical lines; or by having a scene expressly devoted to a fac-simile imitation of nature. Where, in planting a park, the object is to cause it to be mistaken for a natural forest, then, if the soil is poor, the birch may be planted or sown in immense quantities; the object in this case being fac-simile imitation. In every residence, also, where there is an arboretum (and we trust that the time will soon come when there will be no gentleman's seat of any extent without one), the birch, like every other indigenous tree, will, of course, find a place. In residences to be formed in hilly or mountainous scenery where the birch does

not abound naturally, no British tree is more ornamental; and the common sort may there be introduced singly, and in groups and masses, along with all the different species and varieties of the genus. Sir Thomas Dick Lauder observes that some birch trees should always be planted near a house, for the very purpose of filling the air with their fragrance, which is given out in great abundance, particularly after rain or heavy dew; more especially in spring, when the resinous matter which produces this fragrance is most abundant on the buds and young leaves.

Poetical Allusions. The birch does not appear to have been celebrated by any ancient writers, though it has been mentioned by most of the modern poets. Shenstone introduces it in his *Schoolmistress*, when alluding to the birchen rods: —

> "And all in sight doth rise a birchen tree,
> Which Learning near her little dome did stow;
> Whilome a twig of small regard to see,
> Though now so wide its waving branches flow,
> And work the simple vassals mickle woe:
> For not a wind might curl the leaves that blew,
> But their limbs shudder'd, and their pulse beat low;
> And, as they look'd, they found their horror grew,
> And shaped it into rods, and tingled at the view."

Pope has also immortalised birch rods in his *Dunciad*. The beauty of the birch tree, and the extreme gracefulness of its foliage, render it a fitting emblem of elegance. Coleridge calls it —

> ——" Most beautiful
> Of forest trees — the Lady of the woods."

and Keats describes —

> ——" The silvery stems
> Of delicate birch trees."

Professor Wilson, also, gives a beautiful description of a birch tree in his *Isle of Palms*.

> —— " On the green slope
> Of a romantic glade we sate us down,
> Amid the fragrance of the yellow broom;
> While o'er our heads the weeping birch tree stream'd
> Its branches, arching like a fountain shower."

Many other modern poets have mentioned this tree, and described its various uses. Phillips says: —

> ——" Even afflictive birch,
> Cursed by unletter'd idle youth, distils
> A limpid current from her wounded bark,
> Profuse of nursing sap."

and Leyden: —

> " Sweet bird of the meadow, soft be thy rest:
> Thy mother will wake thee at morn from thy nest;
> She has made a soft nest, little redbreast, for thee,
> Of the leaves of the birch, and the moss of the tree."

Numerous other instances might be given; but these may suffice to show the popularity of the tree among the observers and lovers of nature.

Soil, Situation, Propagation, Culture, &c. In the beginning of the last century (see p. 102.), the Earl of Haddington, who was the greatest and most judicious planter of his time, called the birch an amphibious plant; as it grows on rich or poor, wet or dry, sandy or rocky situations, nor refuses any soil or climate whatever. Though the birch is found in every kind of soil, as Sang observes, "from that of a deep moist loam in a low bottom, to a poor sandy, gravelly, or moorish earth;" or, according to Ray, "in turfy soil over sand," alike in plains and in mountainous situations; yet it "luxuriates most in deep loams, lying on a porous subsoil, or in alluvial soil, by the sides of rivers, or smaller streams. Even in such situations," Sang continues, "though among stones and rocks, as on the River Dee, in Aberdeenshire, in particular, the birch flourishes most exuberantly. On the sides of hills, in dry soils, it grows slowly; but on such its timber is most durable." (*Plant. Kal.*, p. 54.)

Though the birch may be propagated by layers, and even by cuttings, yet plants are not readily produced otherwise than by seed; and those of certain varieties, which are procured from layers, or by inarching, never appear to grow with the same vigour as seedlings. Birch seed ripens in September and October; and may be either gathered and sown immediately, or preserved in a dry loft, and sown in spring. Sang directs particular attention to be paid to gathering the seeds only from weeping trees; and this we know to be the directions given to the collectors employed by the nurserymen in the north of Scotland. If the seeds are to be sown immediately, the catkins may be gathered wet; but, if they are to be kept till spring, they ought not to be gathered except when quite dry; and every day's gathering should be carried to a dry loft and spread out thinly, as they are very apt to heat when kept in sacks, or laid up in heaps. The seeds should be sown in very fine, light, rich soil, in beds of the usual width, and very slightly covered. Boutcher says: — "Sow the seeds and clap them into the ground with the back of the spade, without any earth spread over them, and throw a little peas haulm over the beds for three or four weeks, till the seeds begin to vegetate. The peas haulm will keep the ground moist, exclude frost, and prevent the birds from destroying the seeds." (*Treat. on Forest Trees*, p. 113.) "It is scarcely possible," Sang observes, "to cover birch seeds too little, if they be covered at all." The plants, if sown in autumn, will come up in the March or April following. If sown in spring, they will come up in May or June; which, in very cold climates, is a preferable season. If any danger is apprehended from moisture in the soil during winter, the alleys between the beds may be deepened, so as to act as drains. In the nursery lines, the plants require very little pruning, and their after-care, when in plantations, is equally simple.

Wherever the birch abounds in woods or coppices, a great many seedling plants spring up; and these in various parts of England, are collected by the country people, and sold to the nurserymen. This is, indeed, the mode by which young trees and hedge plants of every kind were obtained before the establishment of commercial nurseries. Young birch plants which have been pulled out of coppice woods, when about two years old, we are informed by Messrs. Young and Penny, of the Milford Nursery, who adopt the practice extensively, "are found to root much better than seedlings of the same age and size taken out of a regular seed-bed; doubtless because, in the latter case, a greater proportion of the taproot requires to be cut off. In the case of the young birches pulled out of the copses, the taproot, which could not get far down into the hard soil, has its substance in a more concentrated form, and is more branching; hence, little requires to be cut off it, except the ragged rootlets, or fibres; and it may be considered as acting as a bulb to the upper part of the plant. The tops of these seedling birches are shortened before planting; and the plants, Mr. Young informs us, make as much wood in one year as regular nursery-reared birch seedlings will in two. It is found in this part of the country, that the downy-leaved black-barked seedling birches (*B.* a. pubéscens) stole much more freely, when cut down as coppice-wood, than the smooth-leaved white-barked weeping variety (*B.* a. péndula). (See *Gard. Mag.*, vol. xi. p. 506.) It appears from Boutcher, that this mode of obtaining young birch trees, was formerly practised in Scotland.

In France and Germany, plantations of birch are frequently made by sowing the seed where the trees are intended finally to remain. For this purpose the poorest soils are harrowed in humid weather, in the month of October, or of November, and 15 lb. of seed, as it is taken from the catkins along with the scales, is sown on an acre, and afterwards covered with a bush harrow. Where the ground is under corn, the seed is sown with the last corn crop, as clover is in England; and, where it abounds with weeds and bushes, these are set fire to, early in the autumn, and the seed sown as soon afterwards as it is gathered from the trees. It is observed by Michaux, that burnt soil is peculiarly favourable to the growth of the birch, which in America reappears, as if by enchantment, in forests that have been burnt down.

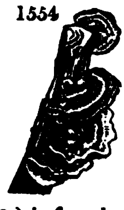
Accidents, Insects, and Diseases. Pallas observes that, in some parts of

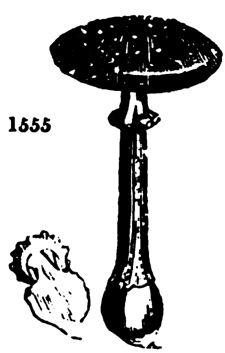
Russia, where whole tracts of forests of different kinds of trees occur, there is scarcely any tree more frequently struck by lightning than the birch; which, he says, refutes the superstitious notion of the Laplanders, who, believing that the tree is never struck by lightning, seek for shelter under its branches in a thunder-storm. It has constantly been observed, he says, that the birch is always struck by the electric fluid transervely, below the top, and shivered to pieces; while the pine is ploughed by a deep furrow from the apex to the ground, tearing off the bark, and leaving the tree entire. The common birch, Mr. Westwood observes, is a tree upon which a very great number of insects feed, seldom, however, causing any mischief of importance. Of these, it will be sufficient to notice a few of the more remarkable; indicating by a star those which not only feed on the birch, but on various other trees; and by a dagger those which feed on the birch only; commencing with the Lepidóptera, the caterpillars of which, either exclusively or partially, subsist upon its leaves. Amongst the butterflies, the Camberwell beauty (Vanéssa Antìopa) is a partial birch-feeder, whilst the brown hair-streak butterfly (Thècla bétulæ) seems to be confined to birch woods; appearing in the winged state in the month of August. Amongst the *Sphíngidæ*, Smerínthus tíliæ (the lime hawk moth) occasionally feeds upon the birch. Amongst the Linnæan *Bómbyces*, the singular lobster caterpillar (Staúropus fàgi) partially feeds upon this tree, and is met with, though but rarely, at Birch Wood, in Kent. * Leiocámpa dictæ'a and * L. dictæöìdes, * Lophópteryx camelìna, * L. carmelìta, * Ptilóphora variegàta, * E'ndromis versícolor (the rare glory of Kent moth), the reputed British species * Aglaía tau, * Eriogáster lanéstris, * Callimórpha miniàta, * Lithòsia quádra. Amongst the *Noctùidæ*, * Apatèla *l*eporìna, * Acronýcta auricoma, † Cerópacha fluctuòsa, * C. flavicórnis (the caterpillar of which is a leaf-roller), * Cósmia trapetzìna, † C. fulvàgo, * Brèpha nòtha, * Catocàla fráxini. Amongst the Geométridæ, * Hybérnia capreolària, * H. prosapiària, * H. defoliària, * Phigàlia pilosària, * Bíston prodromàrius, * B. betulàrius, * Hippárchus papilionàrius, † Cabèra exanthémata, † Melaníppe hastàta, † Emmelèsia heparàta. Amongst the smaller moths, † Platýpteryx *l*acértula, * Drépana falcatària, * D. unguícula, * *Pýralis* bárbalis, † Antithèsia betuletàna, † Anacámpsis betùlea, *Ægèria sphecifórmis* (one of the small clear-winged hawk moths), and Zeuzèra æ'sculi (*fig.* 636. in p. 887.), feed upon the wood of the birch. The coleopterous insects, Balanìnus bétulæ, Deporàus bétulæ, Rhynchìtes bétulæ, and Chrysomèla bétulæ, also feed upon the birch in the larva state, and are found upon it when they have attained their imago form, devouring the tender leaves and young shoots. Several species of Tenthredínidæ, or saw flies, also feed upon the leaves whilst larvæ, including Selándria betulèti, and Lýda bétulæ. The little flat hemipterous insect A'radus bétulæ resides beneath the bark, whilst A'phis bétulæ, Cóccus bétulæ, and Psýlla bétulæ subsist upon the young shoots and buds. When the birch begins to decay, various fungi root themselves into its wood. The principal of these are Dædàlea *b*etùlina *Fries* (*Agáricus betùlinus L.*, and our *fig.* 1553.), Polýporus *b*etùlinus *Fries* (*Bolètus betùlinus Bull.* t. 312.), and P. versícolor *Fr.* (our *fig.* 1554.); of these, P. *b*etùlinus generally grows on the trunks of dead trees, and has white flesh, which has an acid taste and smell. The epidermis is very thin and delicate, and easily peels off; when dry the whole plant is very light, and its texture is between coriaceous and corky. (*Eng. Fl.*, v. p. 140.) Polýporus fomentàrius (see *Q. Ròbur*) and P. nígricans *Fries* are also found on the birch. The latter, though called the black amadou, is quite unfit for making tinder. It is a very distinct species, and is of a bright shining black, though, when old, the epidermis becomes cracked, and of a dull ash colour. Rádulum orbiculàre *Fr. El.*, 1. p. 149. (*Hýdnum rádula Fries Syst. Mus.*, 1. p. 423.; *H. spathulàtum Grev. Fl. Edin.*, p. 406.) is found on the trunks of dead birches. Phlèbia radiàta *Fries* grows on the living birch

1553



1554





1555

trees. This is a very singular fungus; it is composed of folds radiating from the centre, with a beautifully radiated margin; it was found at Appin, in Argyllshire. Sphæ'ria multifórmis *Fries* is also found on the birch. To this list may be added *Agáricus* muscàrius *L.* (*fig.* 1555.), the fly agaric, the most poisonous of all the genus, which is generally found in birch woods. It is highly narcotic, producing, in small doses, intoxication and delirium, for which purpose it is used in Kamtschatka; and, in larger doses, death. For a detailed account of its poisonous effects, see Roque's *Hist. des Champ.*, p. 123.; and a paper by Dr. Greville, in the 4th vol. of the *Wernerian Trans.*, from which an extract is given by Dr. Lindley, *Introd. to Nat. Syst. of Bot.*, p. 337. (*Eng. Fl.*, vol. v. p. 4.)

Statistics. Recorded Trees. A weeping birch, at Ballogie, in the parish of Birse, in Aberdeenshire, measured, in 1798, 5 ft. in circumference at 4 ft. from the ground. It had a clear straight stem, about 50 ft. high, of nearly equal thickness throughout; and the total height of the tree was supposed to be about 100 ft. (*Stat. Hist.*, vol. ix. p. 129.) In the Forest of Tarnawa, in Morayshire, there are several birches which girt 9 ft, at 4 ft. from the ground. (*Ibid.*, vol. viii. p. 557.) Sir Thomas Dick Lauder says that there are now many in the same forest which girt 10 ft. and 11 ft.; and he measured one which girted 13 ft. at 3 ft. from the ground. (*Lauder's Gilpin*, vol. i. p. 283.) In France, in the time of Du Hamel, there was a superb weeping birch at Ermenonville, which stood beside the Temple of Philosophy, in the park, and hung over part of the building.

Existing Trees. In the environs of London, in the Fulham Nursery, 40 years planted, it is 50 ft. high. In Dorsetshire, at Melbury Park, 50 years planted, it is 72 ft. high; in Wiltshire, at Wardour Castle, 40 years planted, it is 60 ft. high, diameter of the trunk 2 ft., and that of the head 30 ft. In Scotland, in Haddingtonshire, at Yester, 80 years planted, it is 73 ft. high, diameter of the trunk 4 ft. 6 in., and of the head 78 ft.; in Forfarshire, at Kinnaird, 100 years planted, it is 70 ft. high, the diameter of the trunk 3 ft., and of the head 54 ft.; in Perthshire, at Taymouth, *B.* álba péndula is 64 ft. high, the diameter of the trunk 2 ft., and of the head 50 ft.; in Ross-shire, at Brahan Castle, the species is 70 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft. In Ireland, in the Glasnevin Botanic Garden, 35 years planted, it is 36 ft. high, the diameter of the trunk 1 ft., and of the head 16 ft.; in Tyrone, at Baron's Court, it is 60 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 50 ft. In France, at Avranches, in the Botanic Garden, 19 years old, it is 49 ft. high, the diameter of the trunk 2½ ft., and of the head 20 ft. In Bavaria, in the Botanic Garden at Munich, 24 years planted, it is 28 ft. high. In Austria, at Vienna, at Laxenburg, 25 years old, it is 20 ft. high. In Prussia, at Berlin, at Sans Souci, 35 years old, the species is 50 ft. high, the diameter of the trunk 2 ft., and of the head 19 ft. In Sweden, at Lund, in the Botanic Garden, 52 ft. high, the diameter of the trunk 9 in., and of the head 18 ft. In Denmark, at Rosenburg, it is between 70 ft. and 80 ft. high. In Russia, near St. Petersburg, at Rudets, on the estate of Madame Constantinoff, 40 years old, it is 71 ft. high, the diameter of the trunk 15 in. In Lombardy, at Monza, 24 years old, it is 45 ft. high, the diameter of the trunk 1 ft., and of the head 20 ft.

■ ♀ 2. *B.* DÄU'RICA *Pall.* The Daurian Birch.

Identification. Pall. Ross., 1. p. 60.; Willd. Sp. Pl., 4. p. 463.; Baum., p. 57.; N. Du Ham., 3. p. 204.; Hayne Dend., p. 166.
Synonymes. *B.* excélsa canadénsis *Wang. Beitr.*, p. 86.; Bouleau de Sibérie, *Fr.*
Engravings. Pall. Ross., 1. t. 39.; Willd. Baum., t. 1. f. 3. and 4.; and our *fig.* 1556.

Spec. Char., &c. Leaves ovate, narrow at the base, quite entire, unequally dentate, glabrous. Scales of the strobiles ciliated on their margins; side lobes roundish. (*Willd. Sp. Pl.*, iv. p. 463.) This species, according to Pallas, its discoverer, is closely allied to *B.* álba, and is found along with that species in Däuria, and part of Asiatic Siberia; but it is not found in European Siberia, nor in Russia. It does not grow so tall as the common birch, and the trunk does not exceed 1 ft. in diameter. The bark is grey, cleft longitudinally, and divided into brown scales, that have the appearance of being burnt. The branches are more subdivided, and more upright, than those of *B.* álba. The leaves are broader, commonly smaller, on shorter petioles, and unequally serrated. The stipules are lanceolate, grey, subpubescent, and deciduous. The male catkins are produced at the ends of the twigs of the foregoing year, two or three together, larger than in the common birch; the females are on the same twigs, lateral, thicker, with larger and more rounded scales; the seed, also, is a little longer; but the mem-



1556

brane which surrounds it is narrower. The wood of the tree is hard, and yellower than that of the common birch. Pallas says that it differs from *B.* nìgra *L.* (the red birch of America), in having smaller stipules, and in the leaves being less frequently, and never doubly, serrated; but, as he had only an opportunity of comparing it with a small dried specimen of the American species, of which he has given us a figure, we cannot place much confidence in his opinion. The young plants bearing this name at Messrs. Loddiges's have every appearance of being nothing more than a stunted variety of the common birch; but these plants are too small and unhealthy to enable us to determine, with certainty, whether they are really of the kind described by Pallas, or not. This species was introduced in 1796; but it is not common in collections. There is a tree at Croome bearing this name, which, after being 30 years planted, is 40 ft. high. One in the Glasnevin Botanic Garden, 35 years planted, is 30 ft. high; and one in the Botanic Garden at Munich, 25 years planted, is 20 ft. high.

Variety.

B. *d.* 2 *parvifòlia* Hayne Dend., p. 167., has the leaves smaller than the species.

3. *B.* FRUTICO'SA *Pall.* The shrubby Birch.

Identification. Pall. Ross., 1. p. 62.; Du Roi Harb. Baum., 1. p. 151.; Willd. Sp. Pl., 4. p. 466., Baum., p. 61.; N. Du Ham., 3. p. 208.
Synonymes. *B.* hùmilis *Schrank Sal.*, p. 56., *Fl. Bavar.*, No. 305.; *B.* quebeccénsis *Schrift. der Gesells. Naturf. Freunde*, 5. p. 196., as quoted by Willdenow.
Engravings. Pall. Ross., 1. t. 40.; Dend. Brit., t. 154.; and our *fig.* 1557.

Spec. Char., &c. Leaves roundish-ovate, nearly equally serrate, glabrous. Female catkins oblong. (*Willd. Sp. Pl.*, iv. p. 466.) This species is always shrubby, and never rises higher than 5 ft. or 6 ft., in moist situations; but, on mountains, it grows to a greater size, and the trunk attains a thickness of 2 in. or 3 in. The whole plant has a stunted appearance. The buds are numerous, and come out soon after those of *B.* álba. The leaves are small, and generally two from the same bud. They are lengthened out, and entire towards the petiole; and towards the end, which is very sharp, they are unequally serrated. The male catkins are sessile at the ends of the twigs, frequently unaccompanied with any leaf: they are more than 1 in. in length, and pendent. The female catkins are lateral from the leaf buds, solitary, alternate, upright, small, commonly peduncled, and accompanied


1557

by a small leaf; and the ripe seeds remain upon them during the winter; their form is cylindric, and they are longer than those of *B.* nàna; the scales are narrow at the base, three-forked at the end; and there are three seeds to each scale, of the same size and form as in *B.* nàna. Pallas found this species in marshes, and on rocky mountains in the cold subalpine regions of Eastern Siberia. According to Willdenow, it is also found in Canada, and in Germany, in Bavaria, and Mecklenburg. About Berlin, it grows to the height of 4 ft. or 5 ft. It was introduced in 1818; and there are plants at Messrs. Loddiges's, and in some other collections.

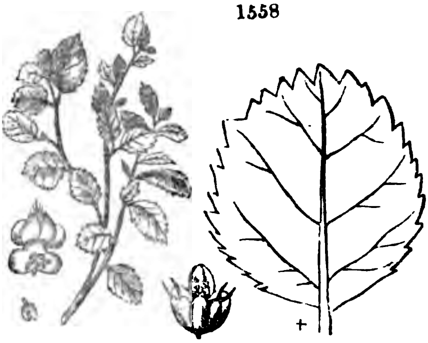
4. *B.* PU'MILA *L.* The *hairy* dwarf Birch.

Identification. Willd. Sp. Pl., 4. p. 467.; Pursh Fl. Amer. Sept., 2. p. 622.; N. Du Ham., 3. p. 207.; Lin. Mant., 124.
Synonyme. *B.* nàna *Kalm Itin.*, 2. p. 263.
Engravings. Jacq. Hort. Vind., t. 122.; Du Roi Harb., 1. t. 3.; Wang. Beitr., t. 29. f. 61.; Dend. Brit. t. 97, and our *fig.* 1558.

Spec. Char., &c. Branches pubescent, without dots. Leaves roundish-ovate, on long footstalks, densely clothed with hairs on the under surface. Female catkins cylindrical. (*Willd. Sp. Pl.*, iv. p. 467.) A shrub, a native of bogs in

Canada, of high mountains in New York and Pennsylvania, where it does not grow above 2 ft. or 3 ft. high, and flowers in May and June. The root is red, and is used for inlaying. It was introduced in 1762; and there are plants at Messrs. Loddiges's. It appears but little different from the preceding sort, and both are probably only stunted varieties of *B.* *álba*.

1558



5. *B.* NA'NA *L.* The dwarf Birch.

Identification. Lin. Sp. Pl., 1394. ; Willd. Sp. Pl., 4. p. 465. ; Fl. Br., 1012. ; Eng. Fl., 4. p. 154. ; Hook. Scot., p. 274. ; Dicks. H. Sicc., fasc. 8. 16. ; Ehrh. Arb., 18. ; Gagneb. Act. Helvet., 1. p. 58. ; Lind. Wicksb., 5. ; Hayne Dend., p. 168. ; Pursh Fl. Amer. Sept., 2. p. 262. ; Lodd. Cat., ed. 1836.

Synonymes. *B.* nàna Suecòrum *Bromel. Chl. Goth.*, 11., *Linn. Act. Suec.*, 1735, 15. ; *B.* No. 1629., *Hall. Hist.*, 2. p. 300. ; *B.* No. 259., *Amm. Ruth.*, 180. ; *B.* palústris pùmila, &c., *Cels. Act. Suec.*, 1732, 3.

Engravings. Am. Acad., 1. t. 1. ; Eng. Bot., t. 2326. ; Fl. Lapp., ed. 2., t. 6. f. 4. ; Lightf., t. 25. ; Pall. Ross., 1. t. 40. f. D. G. ; Fl. Dan., t. 91. ; and our *fig.* 1559.

Spec. Char., &c. Leaves orbicular, crenate, reticulated with veins beneath. (*Eng. Fl.*, iv. p. 154.) A bushy shrub, seldom exceeding 2 ft. or 3 ft. in height; with numerous branches, slightly downy when young, and beset with numerous, little, round, firm, smooth, sharply crenated leaves, beautifully reticulated with veins, especially beneath; and furnished with short footstalks, having a pair of brown lanceolate stipules at their base. Catkins erect, stalked, cylindrical, obtuse; the barren ones lateral, and the fertile ones terminal. Scales of the latter 3-lobed, 3-flowered, permanent. Stigmas red. (*Smith's Eng. Fl.*, vol. iv. p. 155.) A native of Lapland, Sweden, Russia, and Scotland, in Europe; and of Hudson's Bay, and other parts of Canada, in America; on mountains, but almost always in boggy places. According to Pallas, it is common in the whole of the north of Russia and Siberia; but not on the mountains of Altai or Caucasus. In wet situations, he says, the shoots grow to the length of 6 ft.; and, in a state of cultivation, they grow as high as 9 ft., and assume an erect form. This shrub is of singular use in the domestic economy of the inhabitants of Lapland. Its branches furnish them with their beds, and their chief fuel; its leaves, with a better yellow dye than that obtained from the common birch; its seeds afford nourishment to the ptarmigan, or white partridge (*Tétrao Lagòpus L.*), which supplies a considerable portion of their food, and also forms an important article of commerce; and, for their medicine, it produces the fungus Polýporus fomentàrius *Mich.*, respecting which some details will be found under the head of Qúercus, sect. *R*òbur, from which the moxa, or amadou, is prepared, and which the Laplanders consider an efficacious remedy in all painful diseases. Such is the wonderful power of adaptation of man, in a country possessing few natural resources. *B.* nàna has been in cultivation in Britain since the days of Miller, and is by no means unfrequent in collections. Price of plants, in the London nurseries, is 2*s.* each; and of seeds, 6*d.* per packet. At New York, plants are 25 cents each.



1559

Varieties.

B. n. 2 *stricta* Lodd. Cat., ed. 1836, is somewhat more erect in habit than the species. There are plants at Messrs. Loddiges's. Pallas men-

tions that the leaves of *B.* nàna vary exceedingly; in the marshes of Siberia, especially near Lake Baikal, and in Lapland and the arctic regions, they are small, and not an inch in length; but in Ingria, and the alpine rocky situations of Dahuria, they are large, and frequently broader than they are long.

♣ 6. *B.* GLANDULO'SA *Michx.* The glandular-*branched* Birch.

Identification. Michx. Fl. Bor. Amer., 2. p. 180.; Willd. Sp. Pl., 4. p. 466.; Pursh Fl. Amer. Sept., 2. p. 622.; N. Du Ham., 3. p. 208.

Spec. Char., &c. Branches beset with glandular dots, glabrous. Leaves obovate, serrate, quite entire at the base, glabrous, almost sessile. Female catkins oblong; scales half 3-cleft. Seeds round, with narrow margins. (*Willd. Sp. Pl.*, iv. p. 466.) A handsome little shrub, not above 2 ft. high; found in Canada, about Hudson's Bay, and on the borders of lakes on the high mountains of New Jersey and Pennsylvania; flowering in May. (*Pursh.*) It seems to correspond, in America, with the *B.* nàna of Europe, and is probably only a variety of that species. It is not yet introduced.

Leaves large. Natives of North America.

♈ 7. *B.* (A.) POPULIFO'LIA *Ait.* The Poplar-leaved Birch

Identification. Ait. Hort. Kew., 3. p. 336.; Willd. Sp. Pl., 4. p. 463.; Baum., p. 55.; N. Du Ham., 3. p. 204.; Du Roi Harb. Baum., 1. p. 144.; Marshal, p. 36.; Pursh Fl. Amer. Sept., vol. 2. p. 620.; Michx. N. Amer. Syl., vol. 2. p. 97.

Synonymes. *B.* acuminàta *Ehrh. Beit.*, 6. p. 98.; *B.* lénta *Du Roi Harb. Baum.*, ed. 1., p. 92., *Wang. Beit.*, p. 45.; white Birch and Oldfield Birch, *Amer.*

Engravings. Michx. Arb., 2. p. 139. t. 2.; Willd. Baum., t. 1. f. 5.; Michx. N. Amer. Syl., vol. 2. t. 71.; and our *fig.* 1560.

Spec. Char., &c. Leaves deltoid, much acuminated, unequally serrated, quite smooth. Scales of the strobiles having roundish side lobes. Petioles glabrous. (*Willd. Sp. Pl.*, iv. p. 463.) A tree, in every respect closely resembling *B.* álba, but growing with less vigour, and not attaining so large a size as that species. A native of North America.

Varieties.

♈ B. (*a.*) p. 2 *laciniàta*, *B.* laciniàta *Lodd. Cat.*, ed. 1836, has large, smooth, shining, deeply cut leaves, and appears to us to belong to *B.* (*a.*) populifòlia, rather than to *B.* álba.

♈ B. (*a*) p. 3 *péndula*, *B.* péndula *Lodd. Cat.*, ed. 1836, has the spray drooping, like that of the weeping variety of the common birch; but whether equally distinct or not, we have been unable to determine, from the very small size of the plants in the London collections.

Description. The poplar-leaved birch, according to Pursh, is a tree from 30 ft. to 40 ft. high; but, according to Michaux, it only attains this height in favourable soils and situations. On trees that are fully grown, the branches are numerous, slender, and drooping. The leaves are smooth on both surfaces, heart-shaped at the base, very acuminate, and doubly and irregularly toothed. The petioles are slightly twisted; and the leaves are thus rendered more tremulous than those of trees on which this disposition is not observed. The buds, a few days after their developement, are slightly coated with a yellowish odoriferous substance, like those of *B.* álba. The trunk of this species is clothed in a bark of as pure a white as that of *B.* papyràcea and *B.* álba; but its epidermis, when separated from the cellular integument, is capable of being divided, like that of *B.* nìgra and *B.* excélsa, into thin sheets, which constitutes an essential difference. (*Michx. N. Amer. Syl.*, ii. p. 98.) The tree is indigenous to barren rocky woods and old fields, from Canada to Pennsylvania. It is rare in Virginia, and does not exist in the other southern states. It is most frequently found in places scantily furnished with wood, where the



1560

soil is dry and meagre. In such situations, it commonly attains the height of 20 ft. or 25 ft.; but single trees, in moist places, grow to nearly double that height, with trunks from 8 in. to 9 in. in diameter. It is less common in America than any other species of birch, being rarely found in groups; and single trees are met with only at considerable intervals. It is most common in the district of Maine; but, even there, it is only seen by the sides of the highways, and in sandy soils that have been exhausted by cultivation. The wood is very soft, brilliant when polished, and perfectly white; but it speedily decays, and, in America, is employed for no purpose, not even for fuel. The twigs are too brittle for common brooms. It was first cultivated in England by Archibald Duke of Argyll, at Whitton, in 1750; and it is to be met with in the principal British and Continental nurseries. When the plants are raised from seed, they make very handsome trees; and, as seed is freely produced, this mode ought always to be adopted: but plants from layers seldom attain any magnitude. The largest trees that we know of in the neighbourhood of London are at Purser's Cross and Syon; where, however, they are under 50 ft. in height. In the Fulham Nursery, there is one 30 ft. high; and the largest tree of this kind in England, seems to be at Doddington, in Gloucestershire, where it is 60 ft. high. In Ireland, in the Glasnevin Botanic Garden, 35 years planted, it is 30 ft. high. The price of plants, in the London nurseries, is from 1*s.* to 1*s.* 6*d.* each, and seeds 1*s.* per quart; at New York, plants are 10 cents each, and seeds 60 cents per pound, or 5 dollars per bushel.

♀ 8. *B.* PAPYRA'CEA *Ait.* The Paper Birch.

Identification. Ait. Hort. Kew., 3. p. 337.; Willd. Sp. Pl., 4. p. 464., Baum., p. 58.; N. Du Ham., 3. p. 205.; Pursh Fl. Amer. Sept., 2. p. 621.

Synonymes. *B.* papyrífera *Michx. Fl. Bor. Amer.*, 2. p. 180., *Marshal*, p. 36.; *B.* lanceolàta *Hort.*; *B.* rùbra *Lodd. Cat.*, ed. 1836; *B.* canadénsis *Lodd. Cat.*; *B.* nìgra *of the Paris nurseries*; Canoe Birch, white Birch, *Amer.*

Engravings. Michx. Arb., 2. t. 1.; Willd. Baum., t. 1. f. 1.; our *fig.* 1561.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves ovate, acuminate, doubly serrate; veins hairy beneath; petiole glabrous. Female catkins on long footstalks, drooping; scales having the side lobes short, somewhat orbiculate. (*Willd. Sp. Pl.*, iv. p. 464.) A North American tree, attaining 60 ft. or 70 ft. in height; and flowering, in America, in May and June. Introduced in 1750.

Varieties.

♀ B. *p.* 2 *fúsca*, *B.* fúsca *Bosc.*—This variety is mentioned, in the *Nouveau Du Hamel*, as having been collected by Bosc in Carolina. The leaves are smaller than those of the species, and less downy. The branches, covered with a short soft down, of a brownish colour, somewhat resemble those of *B.* nìgra *Ait.*

♀ B. *p.* 3 *trichóclada* Hort. has extremely hairy branches, and its twigs in threes. It has heart-shaped leaves. There is a tree in the Horticultural Society's Garden.

♀ B. *p.* 4 *platyphýlla* Hort. has very broad leaves.

Description, &c. The largest size which this tree attains in North America, according to Michaux, is about 70 ft. in height, with a trunk 3 ft. in diameter; but a writer in the *Gardener's Magazine* mentions trees which girt from 18 ft. to 20 ft. in the settlements of the Hudson's Bay Company. Its branches are slender, flexible, and covered with a shining brown bark, dotted with white. The leaves are borne on petioles four or five lines long, and are of a middling size, oval, unequally denticulated, smooth, with scarcely any hairs, and of a dark green. The catkins are pendulous, and about 1 in. in length: the seeds are ripe towards the middle of July. On trees the trunks of which do not exceed 8 in. in diameter the bark is of a brilliant white; and is as indestructible as the bark of *B.* álba. The heart wood of this tree, when first laid open, is of a reddish hue; and the sap wood is perfectly white. It has a fine glossy grain, with a considerable share of strength; but speedily decays when exposed to alternate dryness and moisture. Michaux considers it, however, equal in point of useful properties to the white birch of Europe. A section of the trunk of a full-grown tree, 1 ft. or 2 ft. in length, immediately below the first ramification, exhibits very elegant undulations of the fibre, representing bunches of feathers, or sheaves of corn. These pieces are divided by cabinet-makers into thin

plates, and are much used by them, in Boston and in other towns situated farther north, for inlaying. The tree affords excellent fuel. The bark, like that of the European species, is, in Canada and the district of Maine, employed for many purposes. It is placed in large pieces immediately under the shingles of the roof, to prevent the water from penetrating through it. Baskets, boxes, and portfolios are made of it, which are sometimes embroidered with silk of different colours. Divided into very thin sheets, it forms a substitute for paper; and, placed between the soles of the shoes, and in the crown of the hat (as the bark of the birch of Europe is in Lapland), it is a defence against humidity. But the most important purpose to which it is applied, and one in which it is replaced by the bark of no other tree, is the construction of canoes. To procure proper pieces, the largest and smoothest trunks are selected. In the spring, two circular incisions are made several feet apart, and two longitudinal ones on the opposite sides of the tree; after which, by introducing a wooden wedge, the bark is easily detached. The plates are usually 10 ft. or 12 ft. long, and 2 ft. 9 in. broad. To form the canoe, they are stitched together with the fibrous roots of the white spruce, about the size of a quill, which are deprived of their bark, split, and rendered supple by steeping in water. The seams are coated with resin of the Balm of Gilead fir. Great use is made of these canoes by the savages, and by the French Canadians, in their long journeys into the interior of the country: they are very light, and are easily transported on the shoulders from one lake to another. A canoe calculated for four persons, with their baggage, only weighs from 40 lb. to 50 lb.; and some of them are made to carry fifteen passengers. (*Michx. N. Amer. Syl.*, ii. p. 88.) A small canoe will carry 20 cwt. In the settlements of the Hudson's Bay Company, tents are made of the bark of this tree, which for that purpose is cut into pieces 12 ft. long and 4 ft. wide. These are sewed together by threads made of the white spruce roots, already mentioned; and so rapidly is a tent put up, that a circular one of 20 ft. in diameter, and 10 ft. high, does not occupy more than half an hour in pitching. The utility of these "rind tents," as they are called, is acknowledged by every traveller and hunter in the Canadas. They are used throughout the whole year; but, during the hot months of June, July, and August, they are found particularly comfortable. It has been proposed to introduce this bark into England, and use it for protecting plants during the winter season, and for various other garden purposes. (See *Gard. Mag.*, vol. xi. p. 407.) The tree was introduced into Europe, and cultivated by Archibald Duke of Argyle, in 1750. It flourishes, Michaux says, in the vicinity of Paris, and is known there in the nurseries under the name of *B.* nìgra; we suppose, because the bark of very young trees is generally black, and the leaves of a very dark green. In the London nurseries, it is not very common; but there are plants of it in the arboretum at Messrs. Loddiges's; and, in 1834, in the Horticultural Society's Garden, there were several trees upwards of 30 ft. high, after being 10 years planted. *B.* papyràcea requires rather a better soil than the common birch, and it is best propagated by seeds, which are annually received from New York. The plant usually known by the name of *B.* papyràcea, in the London nurseries, is the *B.* rùbra of Michaux, jun., the *B.* lanulòsa of Michaux, sen., and our *B.* nigrà, No. 9. This mistake has arisen from the bark of *B.* nìgra, even in trees not above 1 in. in diameter, separating from the trunk, and rolling up in very thin paper-like laminæ.



1561

Statistics. In the environs of London, at Syon, it is 47 ft. high, diameter of the trunk 1 ft. 1 in.,

and of the head 32 ft. In Devonshire, at Endsleigh Cottage, 10 years planted, it is 27 ft. high; in Buckinghamshire, at Temple House, 40 years planted, it is 25 ft. high, diameter of the trunk 10 in., and of the head 16 ft.; in Staffordshire, at Trentham, 26 years planted, it is 34 ft. high. In Ireland, near Dublin, at Cypress Grove, it is 55 ft. high, diameter of the trunk 1 ft. 9 in., and of the head 40 ft. In France, at Paris, in the Jardin des Plantes, 30 years old, it is 32 ft. high, the diameter of the trunk 2½ ft., and of the head 30 ft. In Hanover, at Göttingen, in the Botanic Garden, 20 years planted, it is 30 ft. high.

Commercial Statistics. Price of plants, in the London nurseries, from 1*s.* to 1*s.* 6*d.* each; and of seeds, 1*s.* per quart. At New York, plants are 25 cents each, and seeds 1 dollar per pound, or 8 dollars per bushel.

⚘ 9. *B.* NI'GRA *L.* The black Birch.

Identification. Willd. Sp. Pl., 4. p. 464., Baum., p. 56.; Ait. Hort. Kew., 3. p. 336.; Pursh Fl. Amer. Sept., 2. p. 621.; N. Du Ham., 3. p. 203.; Dend. Brit., t. 153.; Lindley, in Penny Cycl.
Synonymes. *B.* lanulòsa *Michx. Fl. Bor. Amer.*, 2. p. 181., *N. Du Ham.*, 3. p. 206.; ? *B.* rùbra *Michx. Arb.*, 2. p. 162.; *B.* angulàta *Lodd. Cat.*, ed. 1836; red Birch, *Amer.*
Engravings. Dend. Brit., t. 153.; Michx. Fl. Bor. Amer., 2. t. 3.; Willd. Baum., t. 1. f. 6.; N. Du Ham., 3. t. 51.; Bot. Cab., t. 1248.; our *figs.* 1562., and 1563.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves rhomboid-ovate, doubly serrated, acute; pubescent beneath, entire at the base. Scales of the strobiles villose; segments linear, equal. (*Willd. Sp. Pl.*, iv. p. 464.) A tree, a native of North America, from New Jersey to Carolina; attaining the height of 70 ft.; and flowering in May. Introduced as *B.* nìgra, in 1736, by Peter Collinson; and again, as *B.* angulàta, in 1817, by Messrs. Loddiges. We have adopted the specific name of nìgra, because it was preferred by Willdenow and Pursh. The figure in Michaux, of which our *fig.* 1562. is a correct copy, differs so much from that given in *Dend. Brit.* (our *fig.* 1563), which we know to be a faithful imitation of the plant which we intend to describe, as it is to be seen at Messrs. Loddiges's, and in various other nurseries, that we are inclined to think there must be some error in the application of the name to the figure in Michaux; though his description agrees perfectly with our plant — the difference between the cuts being in the position of the catkins.

Description, &c. A tree, when full grown, attaining the height of 70 ft., in Virginia and North Carolina. The trunk and the largest limbs are covered with a thick, deeply furrowed, greenish bark; but, on trees with trunks not exceeding 8 in. or 10 in. in diameter, the epidermis is reddish, or of a cinnamon colour; "whence, probably," says Michaux, "the appropriate denomination of red birch. The epidermis of this species, like that of the canoe birch (*B.* papyràcea), divides itself transversely into thin transparent sheets, which appear to be composed of a mixed substance, instead of presenting a pure homogeneous texture. Hence they have not a uniform transparency, nor a perfectly even surface: compared with the bark of the canoe birch, they are like coarse paper compared with fine. When this tree is fully expanded, its summit is ample; but the uncommon thickness of its branches prevents it from appearing tufted. The twigs which form the extremity of the tree are long, flexible, and pendulous; and the limbs are of a brown complexion, spotted with white: their bark is slightly uneven; while on other branches it is smooth and glossy. The petioles of the red birch are short and downy; the leaves, on young trees, are about 3 in. long, and 2 in.

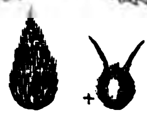


1562

broad, of a light green on the upper surface, and whitish beneath; though on old trees they are much smaller: they are doubly denticulated at the edge, very acuminate at the summit, and terminated at the base in an acute angle, more regular than is seen in the leaf of any other tree. The female catkins, in America, are 5 in. or 6 in. long, straight, and nearly cylindrical; about London, they are not half the size. The seeds are ripe in the beginning of June." (*N. Amer. Syl.*, ii. p. 101.) "No species," Dr. Lindley observes, "can be better



1563



marked than this, which appears, however, rarely to have found a place in collections. Its leaves are nearly as large as those of the canoe birch (*B.* papyràcea); and they are remarkably angular. The stipules are unusually large, and more resemble those of the platanus than the birch." (*Penny Cycl.*)

The most northerly situation in which this tree is found in the United States is in New Jersey, about 10 miles from New York; but it is abundant in Maryland, Virginia, the upper part of the Carolinas, and in Georgia. It is not, like the other species, found growing in the midst of the forest, but only on the banks of rivers, accompanied by the *Plátanus* occidentàlis, *A'*cer eriocárpum, and some species of willow. It grows, with the greatest luxuriance, on the sides of limpid streams which have a gravelly bed, and the banks of which are not marshy. The wood of the red birch is compact, and very nearly white; and the colour of the sap wood and the heart wood is very nearly the same. Like that of the juneberry (*Amelánchier* Botryàpium), it is longitudinally marked by red vessels, which intersect each other in different directions. The negroes make bowls and trays of it, when they cannot procure poplar. The hoops for rice casks are made of its young shoots, and of branches not exceeding 1 in. in diameter; and the spray makes better brooms than that of any other species of American birch. "Among all the birches," says Michaux, "this is the only species, the growth of which is invigorated by intense heat." For this reason, he recommends it for cultivation in Italy, and, we may add, for the temperate regions of Australia. In the climate of London, it scarcely attains a timber-like size; but there is a tree of it at Syon, of which we have given a portrait in our last volume, which is 47 ft. high; one in the Fulham Nursery, which died in 1834, was 30 ft. high; and one at Croome, 40 years planted, is 45 ft. high. In all these places it is known as *B.* papyràcea; which name it has obtained from the paper-like laminæ of its epidermis, which separate and curl up for the whole length of the trunk; and this not only in old trees, but in plants of three or four years' growth. From this circumstance, it can never be mistaken for any other species of birch, either in winter or summer. The bark which comes nearest to it is that of *B.* daùrica, as represented in the engraving of the trunk of an old tree of that species in Pallas's *Flora Rossica*. There are plants at Messrs. Loddiges's, and in several of the London nurseries. They are generally raised from imported seeds; but seeds ripen in this country, when the tree has attained the age of six or eight years. Plants, in the London nurseries, are from 1*s.* to 1*s.* 6*d.* each; and seeds 1*s.* per quart. At New York, plants are 25 cents each, and seeds 1 dollar and 50 cents per pound, 50 cents per quart, or 8 dollars per bushel.

♀ 10. *B.* EXCE'LSA *H. Kew.* The tall Birch.

Identification. Ait. Hort. Kew., 3. p. 337.; Willd. Sp. Pl., 4. p. 464., Baum., p. 60.; Pursh Fl. Amer. Sept., 2. p. 261.; N. Du Ham., 3. p. 203.
Synonymes. *B.* lùtea *Michx. Arb.*, 2. p. 152.; ? *B.* nigra *Du Roi Herb. Baum.*, 1. p. 148.; yellow Birch, *Amer.*
Engravings. Michx. Arb., 2. t. 5.; Wats. Dend. Brit., t. 95.; N. Du Ham., 3. t. 52.; Willd. Baum., t. 1. f. 2.; and our *fig.* 1564. from Michaux, and *fig.* 1565. from the *Nouv. Du Ham.*

Spec. Char., &c. Leaves ovate, acute, serrated; petioles pubescent, shorter than the peduncles. Scales of the strobiles having the side lobes roundish. (*Willd. Sp. Pl.*, iv. p. 464.) A tree, from 70 ft. to 80 ft. high, in North America; and flowering there in May and June. Introduced about 1767.

Description, &c. The specific name of excélsa, Michaux observes, is injudiciously applied to this species, as it leads to an erroneous opinion that it surpasses every other in height. It is a beautiful tree, and its trunk is of

nearly a uniform diameter, straight, and destitute of branches for 30 ft. or 40 ft. It is particularly remarkable for the colour and arrangement of its epidermis, which is of a brilliant golden yellow, and frequently divides itself into very fine strips, rolled backwards at the ends, and attached in the middle. The young shoots and leaves, at their unfolding, are downy. Towards the end of summer, when fully expanded, the leaves are perfectly smooth, except the petiole, which remains covered with fine short hairs. The leaves are about 3½ in. long, and 2½ in. broad; oval, acuminate, and bordered with sharp irregular teeth. The leaves, the bark, and the young shoots, have all an agreeable taste and smell, similar to those of the black birch (*B.* lénta), though they lose it in drying. In its fructification, this species nearly resembles *B.* lénta. The female catkins are borne on short peduncles, and are twelve or fifteen lines long, and 5 or 6 lines in diameter; straight, of an oval shape, and nearly cylindrical.



1564

The scales which compose them are trifid, pointed, and about 3 lines in length; viewed through a lens, they are seen to be downy. Beneath these scales are the small-winged seeds, which are ripe, in America, about the 1st of October. (*N. Amer. Syl.*, ii. p. 104.) It abounds in the forests of Nova Scotia, of New Brunswick, and of the district of Maine. In New Jersey and Pennsylvania, it is rare, and only met with in moist and shady situations. It is confounded by the inhabitants of these countries with *B.* lénta, which is very abundant there, and to which it bears a striking resemblance. In the district of Maine, it is always found in cool and rich soils, among ash trees, the hemlock spruce, and the black spruce. It attains the height of 60 ft. or 70 ft., with a trunk of more than 2 ft. in diameter. It requires a moister soil than most of the other American birches. "The wood of the yellow birch is inferior in quality and appearance to that of *B.* lénta, and never assumes so deep a shade; but it is strong, and, when well polished, makes handsome furniture. In Nova Scotia, and in the district of Maine, it is found by experience, to be every way proper for that part of the framework of vessels which always remains in the water.

1565



In the district of Maine, it is preferred for the yokes of cattle, and for the frames of sledges; and, in Nova Scotia, the young saplings are almost exclusively employed for making the hoops of casks." (*N. Amer. Syl.*, vol. ii. p. 105.) The wood is excellent for fuel, and the bark is highly esteemed by tanners. Boards of this tree were formerly imported into Ireland and Scotland in large quantities, and were much used in joinery. Michaux considers it better adapted to the soil and climate of Germany than to those of France, on account of the moisture which it requires. Though this species has been in British gardens since 1767, when it was introduced by Mr. Gordon of the Mile End Nursery, yet it is not common in collections. There are plants in the arboretum of Messrs. Loddiges, but they are small; and to us they appear to bear a close resemblance in their leaves to *B.* lénta. Willdenow mentions that there are no large trees of this kind about Berlin. Plants, in the London nurseries, are

from 1*s.* to 1*s.* 6*d.* each, and seeds 1*s.* 6*d.* per quart; at Bollwyller, the young plants may be obtained for 2 francs; and at New York, plants are 25 cents each, and seeds 1 dollar and 35 cents per quart, and 4½ dollars per bushel.

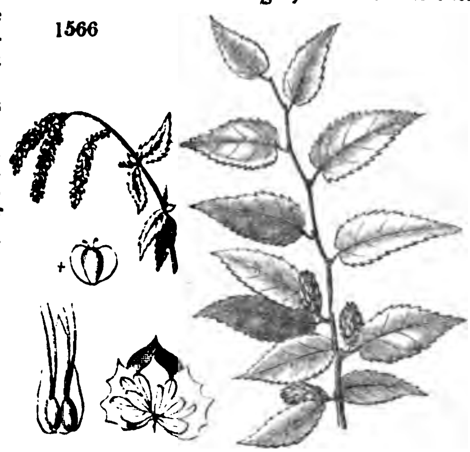
¥ 11. *B.* LE'NTA *L.* The pliant Birch.

Identification. Willd. Sp. Pl., 4. p. 464., Enum., 981., *Baum.*, p. 49.; Wend. Coll., 2. p. 8.; Pursh Fl. Amer. Sept., 2. p. 621.; N. Du Ham., 3. p. 205.; Lodd. Cat., ed. 1836.
Synonymes. *B. carpinifòlia Ehrh. Beitr.*, 6. p. 99., *Willd. Enum.*, 981., Baum., p. 49., *Wendl. Coll.*, 2. p. 81., *Michx. Arb.*, 2. p. 145.; *B.* nìgra *Du Roi Herb.*, 1. p. 93., *Wang. Beitr.*, p. 35. The plant is, under both these names, and also under that of *B.* lénta, in Loddiges's arboretum. Black Birch, Cherry Birch, Canada Birch, sweet Birch, Mountain Mahogany, *Amer.*; Bouleau Mérisier, *Fr.*
Engravings. Wang. Beitr., t. 15. f. 34.; Wend. Coll., 2. t. 41.; Michx. Arb., 2. t. 94.; and our *fig.* 1566.

Spec. Char., &c. Leaves cordate-ovate, acutely serrated, acuminate; petioles and nerves hairy beneath. Scales of the strobiles smooth, having the side lobes obtuse, equal, with prominent veins. (*Willd. Sp. Pl.*, iv. p. 464.) A tree, from 60 ft. to 70 ft. high; a native of North America, from Canada to Georgia; and flowering there in May and June. Introduced in 1759.

Description, &c. According to Pursh, this is an elegant and large tree, the most interesting of its genus, on account of the excellence of its wood. In favourable situations, it sometimes exceeds 70 ft. in height, with a trunk 2 ft. or 3 ft. in diameter. The outer bark, on old trees, detaches itself transversely at intervals, in hard plates, 6 in. or 8 in. broad; but, on trees with trunks not more than 8 in. in diameter, the bark is smooth, greyish, and perfectly similar in its colour and organisation to that of the cherry tree. In the neighbourhood of New York, *B.* lénta is one of the first trees to renew its leaves. These, during a fortnight after their appearance, are covered with a thick silvery down, which afterwards disappears. They are about 2 in. long, serrated, somewhat cordiform at the base, acuminate at the summit, of a pale tint, and fine texture. In general appearance, they are not unlike those of the cherry tree. The young shoots are brown, smooth, and dotted with white, as are also the leaves. When bruised, the leaves diffuse a very sweet odour; and, as they retain this property when dry if carefully preserved, they make an agreeable tea, with the addition of sugar and milk. The male catkins are flexible, and about 4 in. long: the female ones are 10 or 12 lines long, and 5 or 6 lines in diameter; straight, cylindrical, and nearly sessile, at the season of their maturity, which is about the 1st of November. The tree is of very rapid growth; as a proof of which, Michaux gives an instance of one, which, in 19 years, had attained the height of 45 ft. 8 in. Michaux found the cherry birch in Nova Scotia, in the district of Maine, and on the estate of Vermont. It is abundant in the neighbourhood of New York, and in Pennsylvania and Maryland. Farther south, it is confined to the summit of the Alleghanies; and it is found throughout their whole range, to its termination in Georgia. On the steep and shady banks of the rivers which issue from these mountains, in deep, loose, and cool soils, it attains its largest size. The wood of *B.* lénta, when freshly cut, is of a rosy hue, which deepens by exposure to the light. Its grain is fine and close: it possesses a considerable degree of strength, and

1566



takes a brilliant polish. The union of these properties renders the wood superior to that of all the other American birches. In Massachusetts, Connecticut, and New York, the wood of this birch is next in esteem to that of the wild cherry (*Cérasus* virginiàna). Tables, bedsteads, arm-chairs, sofas, coach panels, shoe-lasts, and a great many other articles, are made of it. Hunter, in his notes to Evelyn's *Sylva*, vol. i. p. 219., says that the sap of this tree is used by the inhabitants of Kamtschatka without previous fermentation; and that the natives strip off the bark when it is green, cut it into long narrow strips, like vermicelli, and, after drying it, stew it with their caviare. Michaux strongly recommends the tree for cultivation, on a large scale, in the north of France, in England, and in Germany; and to the lovers of curious trees, "as eminently adapted, from the beauty of its foliage and the agreeable odour of its flowers, to figure in their parks and gardens." Though cultivated by Miller as early as 1759, it has never been much introduced into plantations, either useful or ornamental. In the year 1818, it was recommended by a committee of the Caledonian Horticultural Society, as likely to prove a better tree than the common birch for the moist and deep soils of the Highland valleys of Scotland; but we have never heard of any of this, or of any other American species of birch being tried there. One reason may be the high price of these plants in the nurseries, which arises solely from the want of demand, as all the species are just as easily raised from seed as the common birch. As these seeds are procurable at very low prices, we repeat our recommendation to private gentlemen to purchase them, and to raise plants in their own nurseries. There are plants of this birch at Messrs. Loddiges's; and there is a considerable tree of it at Syon, which ripens abundance of seeds yearly. In Ireland, at Oriel Temple, 50 years planted, it is 52 ft. high; diameter of the trunk 1 ft. 9 in., and of the head 42 ft. Plants, in the London nurseries, are from 1*s.* to 1*s.* 6*d.* each; and seeds are 1*s.* per quart. At New York, plants are 12 cents each; and seeds 60 cents per pound, 30 cents per quart, and 5 dollars per bushel.

App. i. *Species of Birch not yet introduced.*

In Royle's *Illustrations*, several species of birch are mentioned as occupying the loftiest stations in the mountains of Nepal, and other parts of the Himalayas, "as might be expected," he adds, "from this genus extending to the highest latitudes." *B. Bhojpàttra* Wall., the most useful and most generally known species, is found on Gossainthan, in Kamaon, or Choor, and in Kedarkanta. *B.* nítida and *B.* cylindrostàchya occur with the former in Kamaon; the latter extending also to Manma and Dhunoultee. *B.* resinífera *Royle*, confined to Kunawar, with catkins resembling those of *B.* lùtea *Michx.*, has leaves something like those of *B.* papyrífera. (*Illust.*, &c., p. 344.) Dr. Lindley has described four of these species in the *Penny Cyclopædia*; and, as they are likely to prove hardy, and will probably soon be introduced, we give the following descriptions from that work, and from the work of Dr. Wallich: —

B. Bhojpáttra *Wall.* The Indian Paper Birch. Leaves oblong-acute, with nearly simple serratures, somewhat heart-shaped at the base; their stalks, veins, and twigs hairy. Female catkins erect, cylindrical, oblong. Bracteas smooth, woody, two-parted, blunt, much longer than the fruit, which has narrow wings. A tree, found on the alps of Gurwal, in Kamaon, where its thin delicate bark furnishes the masses of flexible laminated matter, of which great quantities are brought down into the plains of India, for lining the tubes of hookahs; and which is used by the mountaineers, instead of paper, for writing upon. The Sanscrit name of the substance is boorjee; a word which Mr. Graves Haughton considers the root of birch; and one of many proofs that the Saxon part of the English language is descended from the Sanscrit. (*Wall. Plant. As. Rar.*, vol. ii. p. 7.) The bark of this species is of a pale cinnamon colour. It is nearly allied to *B.* papyràcea. It would form a beautiful tree in this country.

B. *acuminàta* Wall. has leaves ovate lanceolate, sharply serrated, taper-pointed, smooth, dotted beneath; leaf-stalks and twigs quite smooth; ripe catkins very long, pendulous, cylindrical, crowded: the rachis, and the bracteas, which are auricled at the base, downy. Found on many of the mountains of Nepal, and in the great valley of that country, following the course of rivers. The flowers and fruit are produced from December to April. It forms a very large and noble tree, from 50 ft. to 60 ft. high, of an oval shape, being covered with branches from its base. The wood is stated by Dr. Wallich to be greatly esteemed by the inhabitants, who employ it for all sorts of purposes where strength and durability are required. "Prof. Lindley thinks that *B.* alnöìdes (*Don's Prod. Nep.*, p. 58.) refers to this variety." (*Wall. Pl. As. Rar.*, t. 109.)

B. *nítida.* The shining Birch. Leaves oblong, taper-pointed, with fine double serratures, the twigs and leaf-stalks hairy. Female catkins pendulous, cylindrical, crowded. Bracts three-lobed, hairy, with the lengthened middle lobe longer than the fruit. A tree, found in Kamaon.

B. *cylindrostàchya* has leaves oblong, taper-pointed, heart-shaped, with fine double serratures; twigs, leaf-stalks, and veins downy; female catkins pendulous, very long, cylindrical; fruit deeply two-lobed; bracts linear-lanceolate, blunt, membranous, with two teeth at the base, fringed with hairs. A tree, found in Kamaon.

CHAP. CV.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER CORYLA'CEÆ, OR CUPULI'FERÆ.

QUE'RCUS *Lin.* Flowers unisexual; those of both sexes upon one plant. — Male flowers disposed in long, slender, pendulous catkins; the catkins in groups. Each flower consists of 8 or more stamens, and these are attended by 6—8 bracteas, that are coherent at the base, and resemble a 6—8-parted calyx. — Female flowers borne upon erect axillary peduncles; a few upon a peduncle. Each flower consists of a pistil, whose ovary, and the basal part of whose style, are invested with an adnate calyx, that is toothed at the tip; and the part of this that covers the ovary is again invested with involucral scales, that are connate with external imbricate bracteal ones. Ovary with 3 cells (? 5 in Q. I'lex), and 2 ovules in each, that at first are erect, soon after pendulous. Style short. Stigma 3-lobed (? 5-lobed in Q. I'lex.), rather fleshy. — Fruit an acorn, mostly oblong or ovate; its lower part invested with an imbricate cup; its base scarred; the rest of its surface invested with the adherent, coriaceous, smooth calyx, that is separable by art; cell, by abortion, 1; seed, by abortion, 1, very rarely 2. — Species numerous. Trees, chiefly large and deciduous; for the greater part natives of the temperate zone of the northern hemispheres, but some of them found on mountains in the torrid zone. Leaves alternate, annual, or persistent. Scales of the buds imbricated. Leaves conduplicate in the bud. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ. Illustr.; Smith Eng. Fl.*, iv. p. 148.; and observation.)

FA'GUS *Tourn.* Flowers unisexual, those of the two sexes upon one plant. — Male flowers in stalked drooping heads, or capitate catkins, 3 or 4 in each, attended by minute deciduous bracteas. Each flower consists of a 5—6-cleft bell-shaped calyx, and 8—12 stamens, that arise from the bottom of the calyx, and extend beyond its mouth. — Female flowers borne 2—6 together, within a pitcher-shaped indistinctly 4-lobed involucre, constituted of numerous unequal bracteal scales, and interior scales grown together. Each flower consists of a calyx, lengthened into a laciniate limb, and investing the ovary. An ovary of 3 angles, and 3 cells, and 2 pendulous ovules in each. — Fruit. Nuts as many as, or fewer than, the ovaries, surrounded by the externally echinate involucre, that becomes 4-valved, and somewhat woody. Nuts upright, having 3 acute corners, crowned at the tip with the hairy lobes of the calyx: each includes 2—3 seeds, pendulous at the tip of the partly obliterated dissepiments, where are the remains of the abortive ovules. — Species few. Trees tall in stature; natives of the colder parts of Europe and America. Leaves alternate, annual, feather-veined, plaited in the bud. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ.; Smith Eng. Fl.*, iv. p. 150, 151.; and observation.)

CASTA'NEA *Tourn.* Flowers unisexual, very rarely bisexual; those of the distinct sexes upon one plant. — Male flowers each consisting of a 6-parted calyx, and 10—15 stamens, affixed to its bottom, and extended beyond its mouth. The flowers are sessile, and disposed in groups along axillary stalks: each group consists of many flowers, and is involucrated by a bractea and a bracteole. — The female flowers consist each of an ovary, tapered to the tip, clothed with a calyx, and crowned by its 6—7—8-cleft limb, and bearing as many styles, and having as many cells, with two pendulous ovules in each. The flowers are disposed 2—3 or more together, within a bell-shaped, and externally bristly involucre, and the involucred groups are disposed upon terminal stalks, that are lengthened out as the flowers advance to the state of fruit; a few at the base of the stalks that bear the groups of male flowers, and some solitarily in the axils of leaves. — Fruit. The involucre is 4-valved, and includes 2—3 nuts; the rest of the number of ovaries being abortive. The nuts are large, and have

a large scar at the base: they have 1 cell, and 1, 2, or 3 seeds. — Species few. Natives of the temperate zone of the northern hemisphere. Leaves alternate, annual, feather-veined, plaited in the bud. (*T. Nees ab Esenbeck Gen. Fl. Germ.; Smith Eng. Fl.*, iv. p. 150—152.; and observation.)

Co'rylus Lin. Flowers unisexual; those of the two sexes in distinct catkins upon the same plant. — Male flowers in cylindrical catkins. Bracteas sessile, imbricate. Two perigonial scales, that cohere at the base, are adnate to the under surface of the bracteal scale. Stamens 8, inserted upon the perigonial scales towards their base, and in about the line of their cohesion. Anthers bearded at the tip of one cell. — Female flowers in a bud-like catkin, which is developed into a branchlet: the flowers are borne at its tip. Bracteal scales ovate, entire. Ovaries many, very minute; grouped; each invested with minute, lacerated, villous, involucral scales, that cohere at the base; having 2 cells, each including 1 ovule, and this apparently erect when young, pendulous when adult. Calyx not obvious; formed of a slightly villous membrane, that covers the ovary to the tip, and, as the ovary progresses to a nut, adheres to it most closely, and becomes part of the shell. Stigmas 2, long, thread-shaped.—Fruit. Nut ovate; included in a large, leafy, tubular involucre, that is lacerate at the tip; without valves, or, very rarely, with 2; scarred at the base; by abortion, 1-seeded. Seed adhering to the remains of the dissepiment. — Species few. Large shrubs and trees, occurring in the colder zones of the northern hemisphere. Leaves alternate, entire, feather-veined. Flowers protruded before the leaves. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ.*, and observation.)

Ca'rpinus Tourn. Flowers unisexual; those of the two sexes in distinct catkins upon one plant. — Male flowers. The catkin lateral, sessile, cylindrical. The bracteas imbricate. The flower consists of 12 or more stamens, inserted at the base of a bractea. Anthers bearded at the tip, 1-celled. — Female flowers in lax terminal catkins. Bracteas of 2 kinds, outer and inner: outer bracteas entire, soon falling off; inner bracteas in pairs, each 3-lobed, with the side lobes much the smaller, forming an involucre about an ovary. Calyx clothing the ovary to near its tip, and adhering to it; toothed at the tip. Ovary with 2 cells, an ovule in each; the ovule early pendulous: one of them becomes abortive. Style very short. Stigmas 2, long, thread-shaped. — Fruit. Nut attended by the involucre, and ovate, compressed, ribbed, clothed except at the base, and tipped with the adnate thin calyx; woody; including one seed.—Species about 3. Natives of Europe, the Levant, and North America. Leaves alternate, annual, feather-veined, plaited in the bud. (*T. Nees ab Esenbeck Gen. Pl. Fl. Germ. Illustr.*)

O'strya Michx. Flowers unisexual; those of the two sexes in distinct catkins upon the same plant. — Male flowers. The bracteas of the catkin simple, imbricate. Flower of 12 or more stamens, inserted at the base of a bractea; filaments branched, each branch bearing an anther; anthers each of 1 cell. — Female flowers. Bracteas small, deciduous. Involucral scales in pairs, hairy at the base, the pair growing together at their opposed edges, and constituting an inflated covering to the ovary, which it conceals. Calyx investing the whole ovary, and extended at the tip into a very short ciliate tube. Ovary having two cells, and 1 ovule in each. Style short. Stigmas 2, long, thread-shaped. — Fruit a nut, minute, ovate, even; bearded at the tip; 1-seeded from abortion; covered by an inflated, nerved, membranous involucre. The fruits of a catkin imbricately disposed into an ovate spike.—Species few. Trees, natives of the temperate zones of both hemispheres. Leaves alternate, annual, feather-veined. (*T. Nees ab Esenbeck*, and observation.)

Genus I.



QUE'RCUS *L.* The Oak. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Lin. Gen., 495.; Juss., 410.; Fl. Br., 1025.; Tourn., t. 349.; Lam., t. 779.; Gærtn., t. 37.

Synonymes. I'lex *Tourn.*; Sùber *Tourn.*; Derw, *Celtic*; Aaack, or Ac, *Saxon*; Al, Alon, or Allun, *Hebrew*; Drus, *Greek*; Chêne, *Fr.*; Eiche, *Ger.*; Eik, *Dutch*; Quercia, *Ital.*; Encina, *Span.*

Derivation. From *quer*, fine, and *cuex*, a tree, *Celtic*, according to Lepelletier: but, according to others, from the Greek word *choiros*, a pig; because pigs feed on the acorns. The Celtic name for this tree (Derw) is said to be the root of the word Druid (that is, priest of the oak), and of the Greek name Drus. The Hebrew name for the oak (Al, or Alon) is said to be the origin of the old English word *llan* (originally signifying an oak grove, or place of worship of the druids, and afterwards, by implication, a town or parish), and also of the Irish words *clan* and *clun*. In the Book of Isaiah, xliv. 14., idols are said to be made of Allun, or Alon; that is, of oak. (*Lowth's Trans.*)

Description. The oaks are trees of temperate climates, mostly of large size, and, in point of usefulness to man, only to be equalled by the pine and fir tribe. The latter may be considered the domestic, and the former the defensive, trees of civilised society, in the temperate regions throughout the world. The oak, both in Europe and America, is the most majestic of forest trees. It has been represented by Marquis (*Rech. Hist.*, &c.) as holding the same rank among the plants of the temperate hemispheres that the lion does among quadrupeds, and the eagle among birds; that is to say, it is the emblem of grandeur, strength, and duration; of force that resists, as the lion is of force that acts. In short, its bulk, its longevity, and the extraordinary strength and durability of its timber, attest its superiority over all other trees, for buildings that are intended to be of great duration, and for the construction of ships. In one word, it is the king of forest trees. The trunk of the oak is not, in general, remarkable either for its length, straightness, or freedom from branches, except when it is drawn up among other trees. In an open situation, the larger species send out numerous very large horizontal branches, so as to form a head broader than the tree is high. The branches, in many of the species, are tortuous towards their extremities, and furnished with numerous twigs, or spray. The main root of the oak, in most species, descends perpendicularly to a considerable depth, unless the subsoil be unpropitious: but it also extends horizontally as widely as the branches; thus taking a firmer hold of the ground than any other tree, with the exception, perhaps, of the walnut, and one or two others. The surface roots, in only one or two species, throw up suckers. The leaves vary in different sections of the genus. In what are called oaks by way of eminence, such as Quércus *R*òbur, *Q.* rùbra, and *Q.* Cérris, which may be considered as the heads of three great families, they are of a shape which is rarely, if at all, to be found in any other genus of plants. The lanceolate leaves of the willow, the cordate leaves of the poplar, and the pinnate leaves of the ash or the acacia, are to be found in many genera; but not so the lobed and sinuated leaves of the oaks of the three sections above mentioned. In other sections, such as that represented by *Q. Ph*éllos and *Q. I'*lex, the leaves are entire, and may be considered as exhibiting commonplace forms. In most of the species, and especially in the larger trees, the leaves are deciduous; but in some sections, as in *Q. I'*lex and *Q.* vìrens, they are evergreen. The flowers are in all inconspicuous, without corollas, and, in general, appearing with, or before, the leaves. The female flowers are, as in most amentaceous plants, less numerous than the male flowers; and, while the male flowers are, for the most part, on pendulous catkins, the female flowers are in many cases sessile. The fruit is in all an acorn; a name in common use, and a form every where known in the temperate climates of the northern hemisphere. This fruit is as distinct in its character and appearance from all other fruits, as the leaves of the common oaks are from all other leaves. The form and size of the nut of the acorn do not differ nearly so much as might be ima-

gined in the different species. Whoever has seen an acorn of the common British oak would be at no loss to detect an oak of any species whatever, provided he saw its fruit; whereas in the case of many genera, such as *Pỳrus*, for example, no man, not a botanist, who had seen an apple or a pear, would recognise as species of the same genus those trees which bore fruit like the mountain ash. In short, the genus *Quércus* may be as easily detected at first sight by its fruit, as the *Abietìnæ* or the Leguminòsæ are by theirs. The acorns of different species differ chiefly in the largeness or smallness, roughness or smoothness, of their calyx, or cup; and in their being sessile or stalked. In general, the oaks of Europe have stalked fruit, and the oaks of America sessile fruit. The fruit of most of the species attains maturity in one year; but in some two years are required. In all, the vital principle is but of short duration; and very few acorns, of any species, will germinate after having been kept a year. The rate of growth of the oak is, in most species, considered slow; though this is not the case when it is planted on suitable soil. The most rapid-growing European species is the *Q. Cérris*; and of the American species, in America, the *Q.* álba. The highest-growing species of oaks belong to the groups *Ròbur*, A'lbæ, and *Cérris*; but full-grown trees belonging to these groups, which have reached 100 ft. in height, are rare. The general height of what are considered large British oaks varies from 60 ft. to 80 ft.; and large American oaks, from 70 ft. to 90 ft. The smallest European oak is the *Q.* hùmilis, which is seldom found higher than 3 ft. or 4 ft., and, according to Marquis, is often in the Landes, near Bordeaux, not more than 1 ft. high when it has attained its full growth; and the smallest American oak is *Q.* pùmila, which is seldom, if ever, higher than 20 in. in a wild state. The oak which attains the greatest magnitude is *Q.* pedunculàta; and this species also appears to be of the greatest duration, both in respect to its life, and to its timber. In ordinary soils and situations, no species of oak attains to maturity in much less time than a century. There are, also, few trees which, when raised from seed, are so long in producing fruit; though there are some exceptions among the European oaks; and *Q.* lanàta, a native of Nepal, we have seen in a pot, bearing acorns, at the age of three or four years. In general, however, the oaks that attain the size of large trees do not produce fruit till they are between 15 and 18 years old. Like most other trees, the oak seldom bears an abundant crop of fruit for two years in succession; and it increases in productiveness with age. All the species of oak push up shoots from the collar when cut down, but only one or two species from the root. In North America, Michaux observes, dwarf, stoloniferous, or creeping oaks occur, the multiplied shoots of which cover immense tracts of land. The meadows situated in the midst of the forests of America are burned annually, either by the Indians or the settlers; who endeavour by this practice to produce a new herbage, not only with a view of feeding their cattle on it, but to attract fawns and other animals from the forests. During these annual conflagrations, the trees often take fire, and whole tracts of forest are destroyed. The roots of the trees, however, generally remain uninjured; and those of the oaks, which spread horizontally, frequently send up shoots which produce acorns, when only two or three feet above the ground. These miniature oaks have been found by travellers, who, unable otherwise to account for their appearance, have fancied them distinct species; but as their acorns, when sown, Michaux observes, "have produced a taproot, like common acorns, without suckers or stoloniferous roots, it is not likely that there are any oaks in America which have naturally trailing stems." (*Hist. des Chênes*, p. 5.) We have observed above, that oaks are generally considered of slow growth; but this chiefly applies to young plants, and as compared with the rate of growth of soft-wooded trees. After oaks have stood in good soil, and a suitable climate, for five or six years, they grow with rapidity till they have attained the age of 30 or 40 years, after which, most of the species live, and continue to increase in size, for centuries. The life of some species of oak extends to upwards of 1000 years. There are some oaks in Britain

which are believed to have been old trees in the time of William the Conqueror; and Pliny mentions a Quércus I'lex which was an old tree when Rome was founded, and which was still living in his time.

Geography. The oak belongs exclusively to climates temperate either by their latitude or their elevation; the heat of the torrid zone, and the cold of the frozen zone, being equally unfavourable to its growth. The common British oak, after being a long series of years in the Botanic Garden at St. Vincent's, never attained a greater height than a shrub, having to contend with the sultry climate of that island. It never shed its leaves till they were replaced by others, and had, in effect, become evergreen. A plant of the cork tree, in the same botanic garden, remained stationary for 12 years. (*L. Guilding* in *Mag. Nat. Hist.*) The oak grows naturally in the middle and south of Europe, in the north of Africa; and, in Asia, in Natolia, the Himalayas, Cochin-China, and Japan. In America, it abounds through the greater part of the northern continent, more especially in the United States; and upwards of twenty species are found in Mexico. No species of Quércus has hitherto been found in Australia, or in any other part of the southern hemisphere, except Java and some of the adjacent islands. In Europe, the oak has been, and is, more particularly abundant in Britain, France, Spain, and Italy. In Britain, two species only are indigenous; in France there are four or five sorts; and in Italy, Greece, and Spain, six or seven sorts. The deciduous oaks are the most prevalent in both hemispheres; and the evergreen kinds are almost exclusively confined to the south of Europe, and to the temperate regions of Asia and Africa. The number of sorts described by botanists as species, and as natives of Europe, exceed 30; and as natives of North America, 40. The latter are all comprised between 20° and 48° N. lat. In Europe, Asia, and Africa, oaks are found from 60° to 18° N. lat., and even in the torrid zone, in situations rendered temperate by their elevation.

In Britain, the oak is every where indigenous. In Norway it is found at N. lat. 60°; in Finland, in N. lat. 60° 27″; in Livonia, N. lat. 56° 30″ and 59° 30″; and in Russia, N. lat. 50°. The species found in these countries is exclusively Q. Ròbur *L.*, including under this name Q. pedunculàta and Q. sessiliflòra. In the north of Germany, and in the north of France, this is also the only species; but in the south of Germany, as in Austria, and in the centre of France, Q. Cérris abounds; and in the south of France, Q. I'lex, Q. Sùber, and some other evergreen species, are found. In Spain, as Captain S. E. Cook informs us, Q. Ròbur is the most abundant, and almost the only species in nearly the whole of the northern district of the country; extending through Navarre, Guipuscoa, Biscay, maritime Castile, and Asturias; but it is never found in the middle region. Q. I'lex is the leading tree throughout the whole of the middle and southern districts of Spain; and the next abundant is Q. gramúntia, which requires a drier climate than the former. Q. gramúntia produces edible acorns, which Cook states are as good as, or superior to, a chestnut. These, he says, were the edible acorns of the ancients, which they believed fattened the tunny fish on their passage from the ocean to the Mediterranean. "These are the bellotas which Teresa, the wife of Sancho Panza, gathered in La Mancha, where they still grow in the greatest perfection, and sent to the duchess." (*Cook's Sketches in Spain*, vol. ii. p. 245. to 252.) In Italy, Q. Cérris and Q. I'lex are the prevailing species in the middle states, Q. pedunculàta in the more northern, and Q. sessiliflòra in the kingdom of Naples. In Greece and Asia Minor, we have Q. E'sculus, with the others before mentioned; and Q. Æ'gilops, Q. *Taúzin*, Q. infectòria, and some other comparatively rare species, are also found there and in the south of France, Spain, Portugal, and Italy.

The oak is never found in perfection except in a good soil, and in a temperate climate. Like almost all other plants, it will thrive in a deep sandy loam, or in vegetable soil; but to attain its full size, and to bring its timber to perfection, it requires a soil more or less alluvial or loamy; and the European oaks are always most luxuriant, and produce the best timber, on a

soil more or less calcareous. No oak in the temperate climates is found of a large size at a great elevation above the level of the sea; or where the climate is very severe in spring. In the Himalayas, and in Mexico, oaks are found of large size on mountains; but then the climate, naturally hot, is only rendered temperate by elevation. All oaks whatever are impatient of spring frosts.

History. The oak, from the earliest ages has been considered as one of the most important of forest trees. It is celebrated, Burnet observes, "in story and in song, in the forest and in the field, and unrivalled in commerce and the arts." It was held sacred alike by the Hebrews, the Greeks, and Romans, and the ancient Britons and Gauls; and it was "the fear of the superstitious for their oracle, at the same time that it was the resort of the hungry for their food." The earliest histories that exist contain frequent references to this tree. The grove planted by Abraham, at Beersheba, was of *allun*, which Hillier considers to have been Quércus E'sculus; and he translates the words *elon Mamre* (Gen., xviii. 1.) the oak grove of Mamre, instead of the plane or terebinthine tree, as *elon* or *ailon* is sometimes rendered. In the like manner, "the plane of Moreh" (Gen., xii. 6.) is said to signify the oak of Moreh; and the plane of Mamre, wherever it occurs, the oak tree, or oak grove, of Mamre. (See *Hierophyticon*, &c.) According to Jewish traditions, the oak of Mamre (Gen., xviii. 1.), under which Abraham stood when the angels announced to him the birth of Isaac, long remained an object of veneration; and Bayle (*Dict. Hist. et Crit.*) says that it was still in existence in the reign of the emperor Constantine. This tree, or rather the grove of Mamre, is frequently alluded to in the *Old Testament;* and in Eusebius's *Life of Constantine* we find the oaks of Mamre expressly mentioned, as a place where idolatry was committed by the Israelites, close to the tomb of Abraham, and where Constantine afterwards built a church. The first mention of the word oak in the English version of the *Bible* appears to be in Gen., xxxv. 8.: — "But Deborah Rebekah's nurse died, and she was buried beneath Bethel under an oak: and the name of it was called Allon-bachuth:" literally, the oak of weeping. Numerous other instances of the mention of oaks occur in the Holy Scriptures, particularly in the case of Absalom, whose hair was caught "by the thick boughs of a great oak." (Second Book of Sam., xviii. 9.) Joshua, before his death, made a solemn covenant with the people in Shechem, and, after writing it in the Book of the Law of God, "took a great stone, and set it up there under an oak that was by the sanctuary of the Lord," as a witness unto them, lest they should deny God. (Joshua, xxiv. 26.)

Among the Greeks, the Arcadians believed that the oak was the first created of trees, and that they were the first people; but, according to others, the oaks which produced the acorns first eaten by men grew on the banks of Achelous. Pelasgus taught the Greeks to eat acorns, as well as to build huts. The oak groves of Dodona, in Epirus, formed the most celebrated and most ancient oracle on record; and Pliny states that the oaks in the Forest of Hercynia were believed to be coeval with the world. Herodotus, and numerous other Greek writers, speak of celebrated oaks; and it was an oak that destroyed Milo of Croton. Pliny states that oaks still existed at the tomb of Ilus near Troy, which had been sown when that city was first called Ilium. Socrates often swore by the oak; and the women of Priene, a maritime city of Ionia, in matters of importance, took an oath by the gloomy oak, on account of a great battle that took place under an oak between the Prienians and other Ionians. On Mount Lycæus, in Arcadia, there was a temple of Jupiter with a fountain, into which the priest threw an oak branch, in times of drought, to produce rain. The Greeks had two remarkable sayings relative to this tree, one of which was the phrase; "I speak to the oak," as a solemn asseveration; and the other, "Born of an oak," applied to a foundling; because, anciently, children, when the parents were unable to provide for them, were frequently exposed in the hollow of an oak tree.

Frequent reference is made to the oak, by ancient writers, on account of the use made of the acorns in feeding swine. In the *Bible*, the woods of

Bashan are mentioned as fit for rearing cattle and feeding swine (Numbers, xxxii.); and it is supposed to have been from this district that the great herd of swine were driven by our Saviour into the Sea of Gennesareth. (*Spreng. Spec. Bot. Ant.*, 17.) The Romans used acorns for the same purpose. In Strabo's time, Rome was chiefly supplied with hogs which were fattened on mast in the woods of Gaul. This mast is supposed to have been the acorns of the common and the Turkey oaks, and of the I'lex; but the word mast is supposed by Burnet, in this case, to have included the mast of the beech, and the nuts of the chestnut. Many laws were anciently enacted relatively to acorns. The Romans expressly provided by the laws of the Twelve Tables, that the owner of a tree might gather up his acorns, though they should have fallen on another man's ground. (*Pliny Nat. Hist.*, xvi. 6.) In more modern times, acorns appear to have been used as a common food for man, as well as for swine. "Little as we now depend for sustenance on the fruits of our forest trees," Burnet observes, "and great as is the value of their wood, the reverse was formerly the case: oak corn, that is, ac-corn, or acorns, some centuries ago, formed an important food both for man and beast." (*Amœn. Quer.*, fol. 1.) In the present day, the native oak of Tunis, Quércus pseùdo-coccífera, is called the meal-bearing tree; probably, as Smith observes, from the use of the acorns as food; and F. A. Michaux mentions that the American Indians obtain an oil from the acorns of the live oak, which they use in cookery. Pliny tells us that, in his time, acorns formed the chief wealth of many nations; and that, in time of scarcity, mast was sometimes ground into meal, tempered with water, and made into bread. He also informs us that, in Spain, acorns were then brought to table to eat; and Strabo states that, in the mountainous parts of that country, the inhabitants ground their acorns into meal. (See *Choul De Var. Quer. Hist.*) During the war in the Peninsula, both the natives and the French frequently fed on the acorns met with in the woods of Portugal and Spain. The numerous herds of swine, which still constitute the chief territorial riches of Spain, are fed, Captain S. E. Cook informs us, on the acorns of the evergreen oaks, which abound in almost every part of the country. In the Morea and Asia Minor, acorns are still sold as food. Desfontaines seems to have relished those of the Quércus *Ballòta*, which are sold in the public markets of Morocco and Algiers, and eaten by the Moors, both raw and roasted. Michaux ate acorns in Bagdad, and speaks with particular praise of those which grow in Mesopotamia and Kurdistan, which, he says, are as long as the finger. He also ate and relished the acorns of Spain. (*Michx. Hist. des Chênes.*) The antiquity of oak forests is attested by the numerous trees which have been dug out of bogs, or raised up from the beds of rivers, after having lain there apparently for many centuries. Fossil oaks, which are particularly abundant in the Isle of Portland, in the limestone known as Portland stone, and of which there is a fine specimen in the front of the magnificent conservatory at Syon House, also afford proof of the great antiquity of this tree. An immense fossil oak was raised from the neighbourhood of the salt pits in Transylvania, in which the woody matter appeared to have been in great part converted into hard salt. Abundance of subterranean oaks have been dug up in Pembrokeshire; and, in the *Philosophical Transactions*, an enormous oak is said to have been discovered in Hatfield Bog in Yorkshire, which was 18 ft. in circumference at the upper end where broken off, and 36 ft. in circumference at the lower end; and, though but a fragment, it measured 120 ft. in length. The timber was perfectly sound; though, from some of the coins of the Emperor Vespasian being found in the bog near it, it is conjectured to have lain there above a thousand years, and may possibly have remained there ever since the great battle fought in Hatfield Forest, between Ostorius and Caractacus, A. D. 52.

The botanical History of the oak may be considered as commencing with the time of Bauhin, who described more sorts than Linnæus. The latter, in his *Species Plantarum*, ed. 3., published in 1744, described 14 species; Willdenow, in his edition of the same work, described 76; Persoon, in the *Synopsis*

Plantarum, 82; and about the same number are described in the *Nouveau Du Hamel*, and by Smith in the article Quércus in *Rees's Cyclopædia*. According to the *Dictionnaire Classique d'Histoire Naturelle*, the total number of species described by botanists up to 1823 was 130; of which one half belonged to America, and of these upwards of 40 to the United States. Humboldt and Bonpland collected 24 species in Mexico; Dr. Wallich and Dr. Royle have found nearly half that number in the temperate regions of India; and Blume found 16 species in Java. If, therefore, we take the number of oaks which have been described by botanists at 150, we shall probably not be far from the truth. Of these, the number indigenous to, or introduced into, Britain is, according to our *Hortus Britannicus*, 62; so that there remain to be introduced nearly 100 sorts. When it is considered that all the oak family are decidedly trees of temperate regions, and would probably all live in the open air in the climate of London, their introduction seems one of the most desirable objects of arboricultural exertion.

The economical History of the European oaks may date from the days of Theophrastus and Pliny; the importance of the genus, and the various uses to which the different species are applied, having been treated of in every work on planting or forest culture since the time of the Greek naturalist. Secondat, in his *Mém. sur l'Hist. Nat. du Chêne*, published in 1785, was the first writer who showed the different qualities of the wood of Q. pedunculàta, Q. sessiliflòra, and Q. *Taúzin*; he also made various experiments to ascertain the strength of the different kinds of oak wood; and endeavoured to prove that Q. sessiliflòra was the Q. Ròbur of the ancients. Fougeroux and Daubenton, both professors, and members of the Académie Royale des Sciences, first pointed out the common error in considering the wood of Q. sessiliflòra, which is common in the old ecclesiastical buildings in France, as the chestnut. (See *Mém. de l'Acad. des Scien.* for 1781, p. 49. and p. 295. The first work on the American oaks which treated of the uses of the timber was that of the elder Michaux, entitled *Histoire des Chênes de l'Amerique*, published in 1801; and the best modern account of them is in the *North American Sylva* of his son, in 3 volumes, 8vo, the English edition of which was published in 1819. Bosc has also published what may be called the popular and economical history of the oak, which is entitled, *Mémoires sur les différentes Espèces de Chêne qui croissent en France, et sur ces E'trangers à l'Empire qui se cultivent dans les Jardins et Pépinières des Environs des Paris*, &c., in the *Mém. de l'Instit. National de France*, 1er *Semestre*, for 1807, p. 307. In this work 50 species are described, of which 14 are considered natives of France. The *Recherches Historiques sur les Chênes*, and the *Essai sur les Harmonies Végétales et Animales du Chêne*, both by Marquis, contain some curious information on the subject. The elder Michaux's work has been translated, and some additions made to it, by Dr. Wade, in his *Quercus*, published in 1809. It is remarkable, that, in Martyn's edition of Miller's *Dictionary*, the part of which treating of Quércus was published in 1807, no notice whatever is taken of the oaks of America, except those which had been described in the *Hortus Kewensis*, though Michaux's *Histoire des Chênes*, &c., was published six years before. The *Amænitates Quercineæ*, by the late Professor Burnet, published in Nos. 5. and 6. of Burgess's *Eidodendron*, 1833, and which occupies 25 folios of the immense pages of that work, is one of the latest essays on the subject, and, like all works that have been written by that learned author, is a very curious and elaborate production, though not so well known as it deserves to be.

Poetical and mythological Allusions. The oak was dedicated by the ancients to Jupiter, because it was said that an oak tree sheltered that god at his birth, on Mount Lycæus, in Arcadia; and there is scarcely a Greek or Latin poet, or prose author, who does not make some allusion to this tree. Herodotus first mentions the sacred forest of Dodona (ii. c. 57.), and relates the traditions he heard respecting it from the priests of Egypt. Two black doves, he says, took their flight from the city of Thebes, one of which flew to the temple of Jupiter Ammon, and the other to Dodona; where, with a human voice, it

acquainted the inhabitants that Jupiter had consecrated the ground, which would in future give oracles. All the trees in the grove became endowed with the gift of prophecy; and the sacred oaks, not only spoke and delivered oracles while in a living state, but, when some of them were cut down to build the ship Argo the beams and mast of that ship frequently spoke, and warned the Argonauts of approaching calamities. (See *Hom. Odys.*, xiv.; *Lucan*, vi. 427.; *Apoll.*, book i., &c.) After giving the account above related, Herodotus adds what he calls the explanation of it. He says that some Phœnician merchants carried off an Egyptian priestess from Thebes into Greece, where she took up her residence in the Forest of Dodona, and erected there, at the foot of an old oak, a small temple in honour of Jupiter, whose priestess she had been at Thebes. The town and temple of Dodona are said by others to have been built by Deucalion, immediately after the great flood, when, in gratitude for his preservation, he raised a temple to Jupiter, and consecrated the oak grove to his honour. This grove, or rather forest, extended from Dodona to Chaonia, a mountainous district of Epirus, so called from Chaon, son of Priam, who was accidentally killed there by his brother Helenus. The forest was, from this, sometimes called the Chaonian Forest; and Jupiter, Chaonian father. (See *Virgil*, *Ovid*, &c.) The oracle of Dodona was not only the most celebrated, but the richest, in Greece, from the offerings made by those who came to it, to enquire into futurity. The prophecies were first delivered by doves, which were always kept in the temple, in memory of the fabulous origin assigned to the oracle: but, afterwards, the answers were delivered by the priestesses; or, according to Suidas, Homer, and others, by the oaks themselves; hollow trees, no doubt, being chosen, in which a priest might conceal himself. During the Thracian war, a deputation of Bœotians consulting the oracle, the priestess told them that, "if they would meet with success, they must be guilty of an impious action:" when, in order to fulfil the oracle, they seized her, and burnt her alive. After this, the Dodonian oracles were always delivered to the Bœotians by men. The oracular powers of the Dodonian oaks are frequently alluded to, not only by the Greek and Latin poets, but by those of modern times. Cowper says, addressing the Yardley Oak, —

> ———"Oh! couldst thou speak
> As in Dodona once thy kindred trees
> Oracular, I would not curious ask
> The future, best unknown; but, at thy mouth
> Inquisitive, the less ambiguous past!
> By thee I might correct, erroneous oft,
> The clock of history; facts and events
> Timing more punctual, unrecorded facts
> Recovering; and misstated, setting right."

And Wordsworth, in his lines addressed to a Spanish oak, celebrated as having been the place of meeting of the ancient lawgivers of Biscay, exclaims,—

> "Oak of Guernica! tree of holier power
> Than that which in Dodona did enshrine
> (So faith too fondly deem'd) a voice divine,
> Heard from the depths of its aerial bower,
> How canst thou flourish at this blighting hour?
> Stroke merciful and welcome would that be
> Which would extend thy branches on the ground,
> If never more within their shady round
> Those lofty-minded lawgivers shall meet,
> Peasant and lord, in their appointed seat;
> Guardians of Biscay's ancient liberty."

Milo of Croton was a celebrated athlete, whose strength and voracity were so great, that it was said he could carry a bullock on his shoulders, kill it with a blow of his fist, and afterwards eat it up in one day. In his old age, Milo attempted to tear an old oak up by the roots; but the trunk split, and the cleft part uniting, his hands became locked in the body of the tree; and, being unable to extricate himself, he was devoured by wild beasts. (*Ovid Met.*, xv.; *Strab.*, xvi.; *Paus.*, vi. c. 11., &c.)

The oak was considered by the ancients as the emblem of hospitality; because, when Jupiter and Mercury were travelling in disguise, and arrived at

the cottage of Philemon, who was afterwards changed into an oak tree, they were treated with the greatest kindness. Philemon was a poor old man, who lived with his wife Baucis in Phrygia, in a miserable cottage, which Jupiter, to reward his hospitality, changed into a magnificent temple, of which he made the old couple priest and priestess, granting them the only request they made to him; viz. to be permitted to die together. Accordingly, when both were grown so old as to wish for death, Jove turned Baucis into a lime tree, and Philemon into an oak; the two trees entwining their branches, and shading for more than a century the magnificent portal of the Phrygian temple. The civic crown of the Romans was formed of oak; and it was granted for eminent civil services rendered to the state, the greatest of which was considered to be the saving of the life of a Roman citizen. Scipio Africanus, however, when this crown was offered to him for saving the life of his father at the battle of Trebia, nobly refused it, on the ground that such an action carried with it its own reward. Lucan alludes to this custom in his *Pharsalia*.

> "Straight Lelius from amidst the rest stood forth,
> An old centurion of distinguish'd worth:
> An oaken wreath his hardy temples bore,
> Mark of a citizen preserved he wore." Rowe's *Lucan*, book i.

Shakspeare, when making Cominius describe the merits of Coriolanus, mentions this crown, as having been won by that hero.

> ——" At sixteen years,
> When Tarquin made a head from Rome, he fought
> Beyond the mark of others: our then dictator,
> Whom with all praise I point at, saw him fight,
> When with his Amazonian chin he drove
> The bristled lips before him: he bestrid
> An o'erpress'd Roman, and i' the consul's view
> Slew three opposers: Tarquin's self he met,
> And struck him on his knee: in that day's feats,
> When he might act the woman in the scene,
> He proved best man i'the field, and for his meed
> Was brow-bound with the oak." *Coriolanus*, act. ii. scene 2.

Acorns having been the common food of man till Ceres introduced corn (*Lucretius*, v. 937., &c.), boughs of oak were carried in the Eleusinian Mysteries.

> "Then crown'd with oaken chaplets march'd the priest
> Of Eleusinian Ceres, and with boughs
> Of oak were overshadow'd in the feast
> The teeming basket and the mystic vase." Tighe.

Virgil, in the first *Georgic*, says,—

> "Bacchus and fostering Ceres, powers divine!
> Who gave us corn for mast, for water wine." Dryden's *Virgil*.

And Spenser alludes to this fable in the following lines:—

> "The oak, whose acorns were our food before
> That Ceres' seed of mortal man was known,
> Which first Triptolemene taught to be sown."

Boughs of oak with acorns were carried in marriage ceremonies, as emblems of fecundity. (*Archæol. Attic.*, 167.) Sophocles, in the fragment of *Rhizotomi*, describes Hecate as crowned with oak leaves and serpents. Pliny relates of the oaks on the shores of the Cauchian Sea, that, undermined by the waves, and propelled by the winds, they bore off with them vast masses of earth on their interwoven roots, and occasioned the greatest terror to the Romans, whose fleets encountered these floating islands. (*Hist. Nat.*, xvi. 1.) Of the Hercynian Forest he says, " These enormous oaks, unaffected by ages, and coeval with the world, by a destiny almost immortal, exceed all wonder. Omitting other circumstances, that might not gain belief, it is well known that hills are raised up by the encounter of the jostling roots; or, where the earth may not have followed, that arches, struggling with each other, and elevated to the very branches, are curved, as it were, into wide gateways, able to admit the passage of whole troops of horse." (*Ibid.*, xvi. 2.) This forest is described

by Cæsar (*Bell. Gall.*, vi.) as requiring sixty days to traverse it; and the remains of it are supposed by some to constitute the forest on the mountains of the Hartz; and by others, to be the Black Forest of the Tyrol.

The beautiful fiction of the Hamadryads is frequently referred to by the Greek poets. The Hamadryads were nymphs, each of whom was

> "Doom'd to a life coeval with her oak." PINDAR.

Callimachus, in the *Hymn to Delos* (v. 80.), represents Melie as "sighing deeply for her parent oak;" and adds,—

> "Joy fills her breast when showers refresh the spray:
> Sadly she grieves when autumn's leaves decay."

In *Apollonius Rhodius*, book ii., we find one of the Hamadryads imploring a woodman to spare the oak to which her existence was attached: —

> "Loud through the air resounds the woodman's stroke,
> When, lo! a voice breaks from the groaning oak.
> 'Spare, spare my life! a trembling virgin spare!
> Oh, listen to the Hamadryad's prayer!
> No longer let that fearful axe resound;
> Preserve the tree to which my life is bound!
> See, from the bark my blood in torrents flows,
> I faint, I sink, I perish from your blows.'"

Among the Celtic nations, the god Teut was worshipped under the form of an oak, or, according to others, Tarnawa, the god of thunder; but these legends, together with the superstitions of the druids, belong rather to the British oak, than to the genus generally.

Properties and Uses. The wood of most of the species of oaks is, comparatively with that of other trees, hard, compact, heavy, tough, and durable; and, in most, the entire plant, and more especially the bark, leaves, and fruit, abound in astringent matter, and in tannin. The wood of the larger-growing European kinds, and more especially of the group *Ròbur*, is considered superior to all other European or American woods for ship-building. The wood of *Q.* álba, and that of *Q.* vìrens, are most esteemed for the same object in America. The wood of the group *Cérris* is also employed in ship-building in Turkey and Greece; more especially, as Olivier informs us, at Constantinople. The wood of the group *I'*lex is very heavy, hard, compact, and durable, and fit for various uses in mechanics and joinery. In America, the wood of *Q.* obtusíloba, the post oak, is considered as one of the best kinds for most purposes of construction. The wood of *Q.* rùbra and *Q.* coccínea has a reddish tinge, but is coarse-grained, porous, and not durable. In general, the evergreen oaks have wood of the finest grain; and the deciduous kinds of the group Rùbræ that of the coarsest grain. There is no purpose in the arts to which the wood of most of the species of oak is not applicable, when it can be obtained of sufficient dimensions; and the durability of the wood of the group *Ròbur* is thought to exceed that of the wood of every other tree used in ship-building, the teak alone excepted. Throughout Europe, and more especially in Britain, oak timber was used for every purpose, both of naval and civil architecture, till the wood of the pine and fir tribe came to be generally imported from the Baltic and North America, about the beginning of the last century. Since that period, the use of oak timber has given way to that of pine and fir in house-building; but it still maintains its superiority in the construction of ships, and various kinds of machines; and even in house-building, where great durability is required. Oak wood is also still employed in joinery and cabinet-making.

The bark of all the species of oak abounds in tannin and gallic acid, and is, or may be, used in tanning; but, in Europe, more especially that of the section *Ròbur*, and, in America, the bark of *Q.* falcàta, *Q.* rùbra, *Q.* tinctòria, and *Q. P*rìnus montícola, are most esteemed for this purpose. The bark of *Q.* tinctòria also furnishes a yellow dye, much used in dyeing wool and silk, and considered preferable to that of the woad. Medicinally, the bark of some of the species affords a substance which may be used instead of quinine.

The bark of Q. *Sùber* furnishes suberine, the suberic acid, and a product by far more important than that of any species of the genus, cork; a substance which is not produced by any other tree whatever, in sufficient quantities to be applied to any useful purpose.

The leaves, the flowers, and the fruit, according to Bosc, afford nourishment to more than 200 species of insects, even in the neighbourhood of Paris; and some of these insects are either valuable themselves in the arts, or they are the cause of excrescences, such as oak galls, which are valuable. The leaves of Q. coccífera afford nourishment to the Cóccus ílicis, a hemipterous insect, which is used in medicine under the name of kermes, and has been employed in dyeing scarlet, from the remotest antiquity, under the name of scarlet grain. This insect is produced, and cultivated for commerce, in the south of France, and in various parts of the south of Europe, and of the East. Oak galls, which are much in demand for the manufacture of ink and for dyeing black, are produced on most of the deciduous European species, and are very abundant on the section *Ròbur*; but the galls of commerce are chiefly produced by the Q. infectòria, a native of Asia Minor and the adjoining countries. All the smaller parts of oaks, such as the spray, buds, leaves, flowers, and fruit, may be employed in tanning; and, accordingly, the cups, or calyxes, of some species are in use for this purpose, more particularly those of the valonia oak (Q. *Æ'*gilops), a native of the Archipelago. The leaves of the section *Ròbur* are used as a substitute for spent tanner's bark in hot-houses; and being slow in decomposition, are found to retain the heat for a longer period than those of any other European trees.

The acorns of all the species are edible; and, in every country where the oak abounds, they form the most important part of the food of wild quadrupeds of the fructivorous or omnivorous kinds, and of some birds. The wild animals most useful to man, which are nourished by them, both in Europe and America, are the wild boar, the stag, and the goat. In Asia, pheasants and pigeons, with other birds in a wild state, eat acorns, no less than wild quadrupeds. In North America, cows, horses, swine, bears, squirrels, pigeons, and wild turkeys devour them. Among the domestic animals which eat and thrive on acorns, the principal is the swine; but there are few animals and birds, in a state of domestication, Bosc observes, that may not be made to live and thrive on them, however unwilling they may be to touch them at first. In the earlier ages, there can be no doubt that acorns, in the countries where they were produced, were the food of man; and they are still, as we have seen, eaten in some parts of the south of Europe, the north of Africa, and the west of Asia. The kinds which produce the acorns most valued for eating are, Q. *I'*lex, Q. *Ballòta*, Q. gramúntia, and Q. *E'*sculus. The degree of bitterness in acorns, produced by the same species, varies exceedingly on different trees; and were any kind of oak to be introduced into orchards as a fruit tree, it would be advisable to select only the best varieties of particular species, and propagate these by grafting. There are even varieties of Q. *Ròbur* which produce acorns much less bitter than others; and we have received some from a tree of this species, in the south of France, which according to Dralet, are so sweet as to be eaten by the inhabitants. (See *Recherches sur les Chênes à Glands doux*, p. 178.)

The entire tree or shrub, in the case of every species of oak, may be considered as highly ornamental: the least so are the willow-leaved oaks, and the most so the lobed and deeply sinuated leaved kinds. The foliage, even, of the same species, and more especially of the deciduous kinds, varies exceedingly; not only on different individuals, but on the same individual at different seasons of the year. In spring, the leaves of many of the deciduous kinds are small, delicate, and beautifully tinged with yellow and red; in summer, they are broad and green; and in autumn, coriaceous, and of a russet brown, scarlet, or blood-red colour. Nothing can be more remarkable than the variation in the forms of the leaves, in the same individual, in some of the American species; those of the tree, when young, being sometimes

lobed or notched, while those of the mature tree are entire; and the contrary. The greatest variations in point of form are, perhaps, to be found in individuals of the group Nìgræ; and the greatest in point of colour, in the group Rùbræ. As a painter's tree, valued for its picturesque effect, when near the eye, no species equals the *Q.* pedunculàta; but for general effect, at a distance, at least in America, the American oaks, the leaves of which die off of a deep red or fine scarlet in autumn, exceed all others. As a botanist's tree, perhaps *Q. Cérris* is the most interesting European species, from the very great variety of forms which its leaves assume; and from their being, in some varieties, persistent in a dried or withered state; and in others, remaining on green throughout the winter. The dwarf oaks, both of Europe and America, are curious miniature trees or shrubs. *Q. I'lex* has many interesting associations connected with it; and *Q. Æ'gilops*, from its remarkable foliage and calycanthus-like cups, is a most singular and beautiful tree. For the purposes of naval or civil construction and tanning, no species is at all to be compared with those belonging to the group *Ròbur*.

Comparing the forms and outlines of oaks with the forms and outlines of other trees, we shall find that they have greatly the advantage in point of character and variety. The forms of all the pine and fir tribe, more especially before they begin to decay, are monotonous; and the same may be said even of the forms of the cypress, the Lombardy poplar, and the weeping willow. If we imagine ourselves in a forest of pines, firs, Lombardy poplars, or weeping willows, it is easy to conceive the melancholy impression that the scenery would produce on us; and hence, perhaps, the suitableness of these, and other uniform regular-headed trees, for cemeteries. But let us imagine ourselves in a forest of oaks, either of one kind, or of several kinds; and how different will be the ideas that will arise in our minds, and the effect that will be produced on our spirits! Oaks, then, not only stand alone in regard to the form of their leaves, and that of their fruit, but even, in a great measure, as to their general shape.

Soil, Situation, and Climate. The oaks, both of Europe and America, to attain their full size, require a deep loamy soil, a situation low rather than elevated and a climate not liable to late spring frosts. It is remarkable that, even in countries where the oak is indigenous, both its blossoms and young leaves are frequently injured by the frosts of spring. The oaks which flourish on the worst soils are the low-growing kinds belonging to the section *I'lex*, and some of the American oaks, especially those belonging to the group *Phéllos*; and those which require the best soil are, the *Q.* sessiliflòra, the *Q. Cérris*, and most of the sorts composing the American group Rùbræ. In elevated situations, or in the extreme north, those species which under favourable circumstances form the most magnificent trees become, as in the case of every other tree, mere shrubs.

Propagation and Culture, Transport of Acorns, &c. The oak is propagated with difficulty by every other mode except from seed; and, generally, time will be gained when the acorns are sown where the plants are intended finally to remain. It is only, therefore, when peculiar varieties are to be continued, that the process of grafting is resorted to; and the mode by approach is almost the only one that is certain of being attended with success. There are instances, however, of whip-grafting succeeding with some species; as, for example, with *Q. Sùber*, *Q. Cérris*, and *Q. C. Lucombeàna*. (See *Gard. Mag.*, vol. xii. p. 698.) When any of the common methods of grafting is adopted, by far the best stock is *Q. Cérris*; on which, also, many of the sorts may be successfully budded; a practice which, we are informed by M. Rosenthal, is general in the Vienna nurseries.

As the mode of raising oaks from the acorn is the same in all the species, we shall here, once for all, give what we consider the necessary details. The acorns need not be gathered from the tree, but may be collected from the ground immediately after they have dropped; and, as in the case of other tree seeds, they may be either sown then, or kept till the following spring. If they

are to be kept, they should be made perfectly dry in the sun, or in an airy shed, mixed with dry sand, in the proportion of three bushels of sand to one bushel of acorns, or with dry moss; and then excluded from the air and vermin, by being put into barrels or boxes, or laid up in a cellar, or buried in heaps, and covered with a sufficient thickness of earth to exclude the weather. If the acorns are to be transported from one country to another, the same mixing with dry sand or dry moss, and exclusion from the air, is adopted; but the more certain mode of retaining the vital principle in acorns is, to mix them with moist earth, or with moist live moss (*Sphágnum*): in either of the latter mediums, they will germinate during a long voyage; but no evil will result from this, provided they are sown immediately on their arrival. When acorns are to be sown in a nursery, the soil ought to be thoroughly prepared and rendered fine; and, after the earth is drawn off the beds, or the drills opened, the acorns may either be scattered over the beds, or along the drills, so that the nuts may be about 2 in. apart; and, to regulate this distance with greater certainty, the sand may be separated from the acorns with a sieve. In either case, the acorns, before covering, must be patted down with the back of a spade in the beds, and with the back of a wooden-headed rake in the drills. The covering, which ought to be of well-broken soil, should vary in depth, according to the size of the acorn; 1½ in. being enough for those of the largest size, such as those of the groups *Róbur*, *A'lbæ*, &c.; and ½ in. for those of the smallest size, such as those of the groups *I'lex*, *Phéllos*, &c. No mode of depositing acorns in the soil can be worse than that of dropping them in holes made by a dibble. The acorn drops into the hole, and becomes wedged by its sides before it gets to the bottom; and, if the upper extremity of the acorn should be downwards instead of upwards, it can hardly be expected to grow. For this reason, the dibber should only be used in pulverised soils; and the point of the instument should be of a diameter greater than the length of the largest acorn which has to be dropped into the hole. As acorns are greedily devoured by vermin, and especially by land rats and mice, they ought to be sown in an open part of the nursery, not near hedges, ditches, or houses; and where, whether in nurseries, or in fields intended to become oak woods, much danger is apprehended from vermin, they ought not to be sown till late in March, so as to lessen the period between the depositing of the acorn and its becoming a plant.

As all oaks, when young, are remarkable for throwing down long and vigorous taproots, and producing few lateral ones, they ought to be sown where they are finally to remain, especially if the subsoil be good, and other circumstances not unfavourable; but, as this cannot always be the case, it is customary among nurserymen to transplant the oak at one or two years' growth, removing great part of the taproot; some of them, however, shorten the taproot without removing the plant, by inserting the spade obliquely in the soil, so as to cut through the roots, at from 6 in. to 8 in. beneath the surface; an operation most conveniently performed when the oaks are sown in drills; because in that case the spade can first be inserted all along one side of the drill, and then all along the other. The French nurserymen, when acorns, walnuts, and other tree seeds which send down very long taproots, are to be reared with a view to being transplanted, sometimes germinate them in moist earth, or in sawdust, placed in a temperature of 50° or 60°; and, after the radicle has been protruded two or three times the length of the acorn or nut, pinch off its extreme point before the seed is committed to the soil. This treatment, which is applicable, as we have seen in the case of the horsechestnut (see p. 466.), to most large-seeded trees, has the effect of immediately causing the taproot to throw out numerous lateral fibres; which is highly favourable for transplantation, though it is not so for the rapid growth of the tree for the first year or two afterwards. To counteract its effect in this respect, when the tree is planted where it is finally to remain, and has grown there two or three years, it ought to be cut down to the ground; after which it will throw up vigorous shoots, and send down perpendicular

roots; and if from the shoots one is selected to form the future tree, and the others carefully rubbed off, the tree will advance at as rapid a rate as if it had been sown where it was intended finally to remain; and, in cases where the subsoil is bad, much more so.

In the future culture of the oak, the trees generally require side pruning when the object is a straight clean trunk. As most of the species grow erect, the hardier deciduous kinds are well adapted for hedgerows; but, as many of the American kinds are comparatively tender, they are most advantageously cultivated in masses. The group I'lex forms excellent evergreen hedges, and most of the species belonging to it endure the sea breeze. The Nepal species, as far as they have hitherto been introduced, require, even in the climate of London, the protection of a wall.

Accidents, Diseases, Insects, parasitic Plants, &c. None of the oaks are so liable to have their branches broken by high winds as most other large trees; but, on the other hand, they are said to be more frequently struck by lightning than other broad-leaved trees of the same size, or than needle-leaved trees of any height. The oak is subject to few diseases, notwithstanding the many kinds of insects that live upon its leaves. As the greater part of our knowledge respecting the insects which feed on the oak relates to those which infest the species comprising the group Ròbur, and those which produce the galls of commerce and the scarlet grain, we shall defer what we have to say on this subject till we come to treat of the species alluded to. The fungi and lichens which live on the oak will be found noticed under the group Ròbur; and others which are common to trees generally will be treated of in a separate chapter, in Part IV. of this work. Fortunately, though the insects infesting the oak often destroy, injure, or disfigure the leaves, yet there are but very few kinds which attack the solid wood till it is in a state of decay; in which respect the oak differs widely from the elm, which, as we have already seen (p. 1387.), is liable to have its wood destroyed by the Scólytus at every period of its existence.

Study of the Species. Till the oaks of America began to attract the notice of botanists, the European species occasioned comparatively little difficulty. The American sorts, however, vary so exceedingly in their leaves at different seasons of the year, in different stages of their growth, and in different localities, that it is next to impossible to fix on a specific character, taken from them, which shall remain constant. The descriptions of the American oaks which have been published are, consequently, of very little use, without figures; and even the figures differ exceedingly in different authors: for example, in the works of the younger and elder Michaux, in Abbott's *Insects of Georgia*, in Catesby's *Carolina*, and in Audubon's *Birds of America*; not to speak of the figures in the *Nouveau Du Hamel*, and other works published on American oaks by botanists who have not been in America.

All the species of oaks hitherto described by botanists have been arranged in sections founded on a single character taken from the leaves. Willdenow, for example, has arranged them in the five following sections: such as, 1. Leaves entire; 2. Leaves toothed; 3. Leaves lobed; 4. Leaves sinuate, with the lobes mucronate; and, 5. Leaves sinuate, but the lobes without any mucros. This arrangement, which has been followed by Smith, and in the *Nouveau Du Hamel* and other works, has, like all others of the kind, the disadvantage of bringing together species which are not allied in perhaps any other particular than that which characterises the section. Thus, in all Willdenow's sections, evergreens are indiscriminately mixed with deciduous kinds; large-leaved, rapid-growing, lofty trees, with small, slow-growing, bushy trees; and so on. We do not mean to say that this arrangement is without its use; but we think it decidedly inferior to one in which the species are thrown into groups according to a totality of characters. Such a classification cannot, in the case of this genus, in our opinion at least, be effected satisfactorily either from dried specimens or drawings; and, therefore, till the whole of the species have been seen in a growing state by one botanist, it cannot

be rendered complete. After duly considering all the materials of which we have been able to avail ourselves, we have thought it best to throw into groups those species which we have seen in a living state in the neighbourhood of London or elsewhere; and to place the remainder in Appendixes, according to their native countries. In characterising our groups, we have followed Scopoli and Michaux, in paying particular attention to the fructification and the bark, as well as to the leaves; and, with regard to the latter, noticing not only their form, but, in the deciduous kinds, the colours which they assume in autumn before dropping off, because we find this a very constant character. Our groups are the following: —

A. *Leaves deciduous.*

a. *Natives of Europe.*

§ i. *Ro'bur.* *British Oaks.* Leaves lobed and sinuated; dying off of a yellowish or russet brown. Bark rough. Buds ovate. Fructification annual. Cups imbricate.

§ ii. *Ce'rris.* *Turkey Oaks.* Leaves lobed and sinuated, or dentated; in some varieties subevergreen; always dying off a dirty white. Bark rough. Buds furnished with linear stipules. Fructification biennial. Cups echinate, ramentaceous, or scaly-squarrose.

b. *Natives of North America.*

§ iii. A'lbæ. *White Oaks.* Leaves lobed and sinuated; dying off more or less shaded with a violet colour. Bark white, and scaling off in thin laminæ. Fructification annual. Cup imbricate, or echinate. Nut oblong, generally large.

§ iv. *Pri'nus.* *Chestnut Oaks.* Leaves dentate; dying off of a dirty white, or of a rich yellowish orange. Bark white, rough, and scaling off. Fructification annual. Cup imbricate. Nut ovate, rather large.

§ v. Ru'bræ. *Red Oaks.* Leaves lobed, sinuated, and deeply cut, mucronated; dying off of a deep red, scarlet, or purple. Bark blackish; smooth or furrowed, but never scaly. Fructification biennial. Nut ovate, and with a persistent style. Cup imbricate, large in proportion to the nut.

§ vi. Ni'græ. *Black Oaks.* Leaves obtusely and very slightly lobed; with mucros, which generally drop off when the leaves have attained their full size; leaves dying off of a blackish green, or very dark purplish red, and in America frequently persistent. Bark quite black, smooth, or furrowed; but never scaly. Fructification biennial. Cup imbricate. Nut with a persistent style, and sometimes marked with dark lines.

§ vii. *Phe'llos.* *Willow Oaks.* Leaves quite entire; dying off without much change of colour; but in America sometimes persisting during two or three years. Young shoots straight and wand-like. Bark very smooth, black, and never cracked. Fructification biennial. Cup imbricate and shallow. Nut roundish and very small.

B. *Leaves evergreen.*

a. *Natives of Europe.*

§ viii. *I'lex.* *Holm, or Holly, Oaks.* Leaves ovate or oval, entire or serrated, with or without prickly mucros. Bark smooth and black, or rough and corky. Fructification biennial. Cup imbricate. Nut ovate, acuminate; sometimes very long in proportion to the cup.

b. *Natives of North America.*

§ ix. Vire'ntes. *Live Oaks.* Leaves oblong-lanceolate; dentate and variously cut when young, but on full-grown trees quite entire. Bark smooth, black. Fructification biennial. Cup imbricate. Nut long.

c. *Natives of Nepal.*

§ x. Lana'tæ. *Woolly-leaved Oaks.* Leaves oval, oblong, or lanceolate; serrated or dentate; woolly beneath.

A. *Leaves deciduous.*

§ i. Ròbur. *British Oaks.*

Sect. Char. Leaves lobed and serrated; dying off of a yellowish or russet brown. Bark rough. Buds ovate. Fructification annual. Cups imbricate. Trees from 30 ft. to above 100 ft. high.

♀ 1. *Q.* PEDUNCULA'TA *Willd.* The *common, or* peduncled, *British* Oak.

Identification. Willd. Sp. Pl., No. 65.; Ehr. Arb., 77.; Pl. Off., 169.
Synonymes. *Q.* Ròbur *Lin. Sp. Pl.*, 1414., *Sm. Fl. Br.*, No. 1., *Eng. Bot.*, t. 1342., *Woodv. Med. Bot.*, t. 136.; *Q. R.* pedunculàtum *Mart. Fl. Rust.*, t. 10.; *Q.* fœ'mina *Roth Germ.*, 1., p. 408., 2. p. 2. 488., *Fl. Dan.*, t. 1180.; *Q.* racèmosa *N. Du Ham.*, 7. p. 177., *Lam. Dict.*, 1. p. 715.; *Q.* cum longo pedunculo *Bauh. Pin.*, 420.; *Q.* Hémeris *Dalech. Hist.*, 4.; Quércus *Fuchs Hist.*, 229., *Matth. Valgr.* 1. p. 184., *Tabern. Kreuterb.*, 1374.; *Q.* navàlis *Burnet*; Chêne blanc *Secondat*, p. 16. t. 3.; Chêne à Grappes, Chêne femelle, Gravelin, *Fr.*; Stiel Eiche, früh Eiche, Thal Eiche, Lohe Eiche, Wald Eiche, *Ger.*
Derivation. The French and German names signify the white oak, the bunch-fruited oak, the female oak, the stalked oak, the early oak (alluding to the production of the leaves), the valley oak, the tanning oak, and the wood oak.
Engravings. Eng. Bot., t. 1342.; Woodv. Med. Bot., t. 126.; Mart. Fl. Rust., t. 10.; Fl. Dan., t. 1180.; Du Ham. Arb., 2. t. 47.; Hunt. Evel. Syl., t. in p. 69.; N. Du Ham., 7. t. 54.; Willd. Abbild., t. 140.; our *fig.* 1567.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves deciduous, oblong, smooth, dilated upwards; sinuses rather acute; lobes obtuse. Stalks of the fruit elongated. Nut oblong. (*Willd.*) A tree, from 50 ft. to above 100 ft. high, with spreading tortuous branches and spray, and, when standing singly, with a head often broader than it is high. It flowers in April, and ripens its fruit in the September following.


1567

Varieties.

♀ Q. *p.* 2 *pubéscens* Lodd. Cat., ed. 1836.— Leaves downy beneath. There are plants at Messrs. Loddiges's, with downy leaves, and the acorns on long footstalks; which shows that they cannot belong to the Q. pubéscens of Willd.

♀ Q. *p.* 3 *fastigiàta*; Q. fastigiàta *Lam. Dict.*, i. p. 725., *N. Du Ham.*, vii. p. 178. t. 55., *Lodd. Cat.*, ed. 1836; Q. pyramidàlis *Hort.*; Chêne Cyprès, Chêne des Pyrénées, *Fr.*; and the plate of this tree in our last Volume. — This is a handsome tree, resembling in general form the Lombardy poplar. It is found in the valleys of the Western Pyrenees, and in the Landes, near Bordeaux, though but sparingly. According to Jaume Saint-Hilaire (*Traité des Arb. For.*), though it is found in the Pyrenees, the Basse Navarre, and the neighbourhood of Bordeaux, it is thought to be originally from Portugal. Capt. S. E. Cook found it in the Pyrenees, in the line to Bayonne, but rarely. He describes it as having a trunk rising only a little way above the roots, and then spreading into a head composed of small branches, as numerous and as vertical as those of the cypress. Bosc (*Mém. sur les Chênes*) describes it as the handsomest of all the oaks for ornamental landscape; in our opinion an error in taste which he has fallen into from the novelty of its form in the oak family, since it is without either the grandeur or the beauty of the common species. In the *Nouveau Du Hamel*, a tree of this variety is mentioned, which had been sown in 1790; and, though it was twice afterwards transplanted, was, in 1819, upwards of 40 ft. high. There are plants at Messrs. Loddiges's, and a tree in the Horticultural Society's Garden, of which latter the plate in our last volume is a portrait. A tree at Carlton, near Darlington, in 1835, was 20 ft. high, after being twenty years

planted. From the circumstance of this variety generally coming true from seed, which, from what is stated in the *Nouveau Du Hamel*, it would appear to do, it is doubtless very distinct; and hence the circumstance of De Candolle and others treating it as a species.

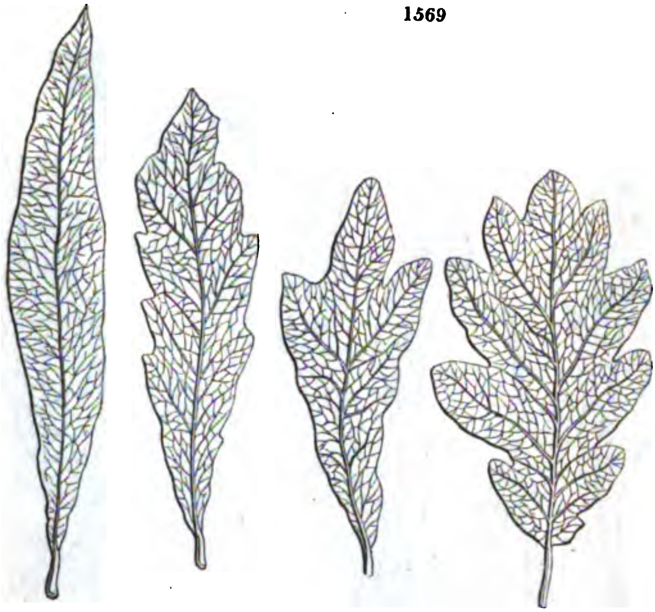
♈ Q. *p.* 4 *péndula*; Q. péndula *Lodd. Cat.*, 1836; the Weeping Oak; has branches decidedly pendulous. The largest tree of this variety that we know of, in England, stands in the park at Moccas Court, Herefordshire, and is, perhaps, one of the most extraordinary trees of the oak kind in existence. It was first pointed out to us in 1806; and we have lately had the following account of it sent to us by Mr. J. Webster, who was then, and is still, gardener and forester at Moccas:—"The tree is in vigorous health. The height of the trunk to the first branch is 18 ft.; girt, at 9 ft. from the ground, 13 ft. 2 in.; total height of the trunk, 75 ft., with branches reaching from about the middle of its height to within 7 ft. of the ground, and hanging down like cords. Many of these branches are 30 ft. long, and no thicker in any part of that length than a common waggon rope. The entire head of the tree covers a space 100 ft. in diameter. The tree bears acorns every year, from which many plants have been raised, all of which partake more or less of the weeping character of the parent; and many so much so, that, when they are young, they are obliged to be supported by props. Many of the trees raised from this oak at Moccas are twenty years before they show much inclination to hang their branches like cords; others begin to do so when they are quite young. There are plants at Moccas, raised from the parent tree, which are 50 years old." (*Gard. Mag.*, vol. xii. p. 368.) *Fig.* 1568. is a portrait of this tree to the scale of 1 in. to 50 ft., which has been reduced from a drawing made for us, in September, 1836, by G. R. Lewis, Esq. Owing to the smallness of the scale, the weeping character is not very obvious in the figure; but it is very striking in the tree. As the tree stands on a steep bank, and the spread of its branches is up and down the slope, our portrait, which is a front view, does not show so great a diameter of head as it would have done, if a side view had been taken. There is a tree of this kind at Messrs. Loddiges's, which was procured from the Lewisham Nursery, where it is supposed to have been discovered in a seed-bed about 1816; and there is one in the Horticultural Society's Garden, raised from an acorn of the Moccas tree, which has not yet become pendulous. There is also a tree of the weeping oak in the neighbourhood of Wisbaden, a portrait of which was kindly lent to us by Lady Walsingham; but we are not certain to what species the tree belongs.



1568

♈ Q. *p.* 5 *heterophýlla*, Q. salicifòlia *Hort.*, Q. laciniàta *Lodd. Cat.*, Q. filicifòlia *Hort.*, and Q. Fennéssi Hort.—In this variety the leaves vary exceedingly in magnitude, in shape, and in being lanceolate and entire, cut at the edges, or deeply laciniated. *Fig.* 1569. shows four leaves, which were sent to us by the Rev. W. T. Bree, from a tree growing in a hedge-row at Allesley, near Coventry. One of these leaves (*a*) is very long and narrow, and quite entire; *b* and *c* are much indented; and *d* approaches to the usual form of the leaf of the British oak. Mr. Bree remarks that those which are first expanded bear the greatest resemblance to the ordinary foliage. There are entire shoots on the tree with foliage of the common kind; and others with narrow foliage, either entire, or denticulated. The tree, at the height of 5 ft. from the ground, had, in 1832, a trunk 3 ft. in circumference; and

1569

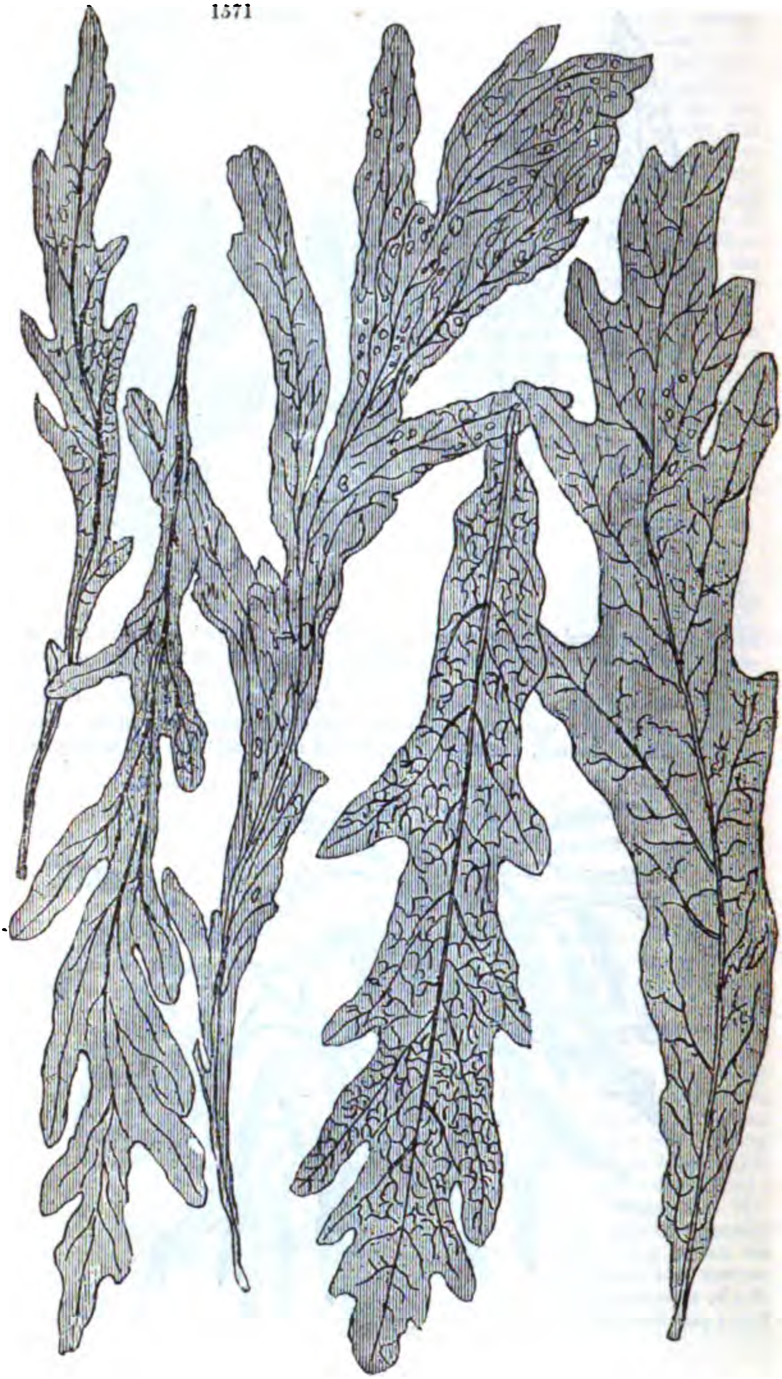


is supposed to be of spontaneous growth. There is a similar tree at Mill Hill, in Middlesex, on entering that village from the London side. (See *Gard. Mag.*, vol. xii. p. 576.) There is another tree of this kind at Munches, in Dumfriesshire; and in Irving's Nursery, Dumfries, there were, in 1831, some scores of seedling oaks of the same kind. Indeed, we have no doubt that in all extensive oak woods, or

1570



1571



countries where the oak abounds, similar varieties might be detected; and, farther, that acorns collected from these varieties would occasionally, if not frequently, produce trees with the same character of foliage; in the same manner as acorns from a weeping oak will produce weeping trees, or from a fastigiate oak fastigiate trees. *Fig.* 1570., to a scale of 1 in. to 4 ft., is a specimen of an oak of this kind, recently brought into notice by Messrs. Fennessey and Son, nurserymen, Waterford. It came up from seed accidentally, about 1820; and the parent tree was, in 1836, 15 ft. high. Some of the leaves are quite entire, and others deeply and curiously cut, as exhibited in *fig.* 1571., drawn of the natural size.

♈ Q. *p.* 6 *fòliis variegàtis* Lodd. Cat. has the leaves variegated with white, with some streaks of red; and, when finely grown, is a very ornamental tree. We have never seen it worth looking at in the neighbourhood of London; but at White Knights there are very handsome specimens, between 20 ft. and 30 ft. high.

♈ Q. *p.* 7 *purpùrea*, Q. purpùrea *Lodd. Cat.*, has the young shoots, and the footstalks of the leaves, tinged with purple. The young leaves, when they first come out, are almost entirely purple, and are very striking. There are plants of this variety at Messrs. Loddiges's, and a young tree in the Horticultural Society's Garden.

♈ Q. *p.* 8 *Hodginsii Lodd. Cat.*, ed. 1836. — From the plants of this variety in the Horticultural Society's Garden, and at Messrs. Loddiges's, it appears to be of a more fastigiate habit of growth, and to have much smaller leaves, than the species.

♈ Q. *p.* 9 *dúlcis*. Chène à Feuilles caduques presque sessiles, *Dralet.* — This variety exists in France, on the borders of the Mediterranean Sea, in the Departments du Gard, de Vaucluse, des Bouches de Rhône, and du Var. The leaves are divided into seven very open lobes, of which the middle one is the largest. The acorns are large, and, according to M. Dralet, very handsome; he adds that they are sweeter than those of a variety of *Q. I'lex*, which, from his description, appears to be *Q. I. Ballòta*. M. Dralet mentions two forms of *Q.* p. dúlcis: one having the leaves thin, with acute lobes, and slightly downy beneath; the acorns being so large as to measure 2¼ in. in circumference: and the other having coriaceous glaucous leaves, with obtuse lobes; and the acorns rather smaller, and borne on peduncles 1½ in. in length. These two forms do not differ from the species in rate of growth, magnitude, or quality of the timber. M. Dralet strongly recommends the propagation of this variety in France, with a view to the employment of the acorns as food. The tree, he says, is planted in avenues, in the department des Bouches du Rhône; and he adds that he gave acorns to the Botanic Garden at Toulouse in 1811, from which young plants were raised. (*Traité de l'Amenagement des Bois et Forêts, &c., suivi de Recherches sur les Chênes à Glands doux*, p. 180.) Through the kindness of M. Vilmorin, we received some acorns of this variety in 1836, which we roasted and endeavoured to eat; but we cannot recommend them from our own experience. The variety, however, ought by all means to be introduced.

Other Varieties. The varieties of British oaks which might be selected from extensive woods of that tree, are without end; but, as these oaks are exceedingly difficult to propagate by any other method than from the acorn, they have been in a great measure neglected by cultivators. The time of leafing and of dropping the leaves varies exceedingly; some oaks retaining their foliage of a deep green for a month or six weeks after others; others, after their leaves have withered, and become of a russet colour, retaining them throughout the winter, like the hornbeam and the beech. Some oaks bud at Christmas, like the Glastonbury thorn; as, for example, the Cadenham oak in the New Forest, near Lyndhurst, mentioned by Parkinson, and by various writers down to the time of Gilpin; and one, that we have heard of, in the Vale of Gloucester. The forms of the trees also vary: some being much more fastigiate than others; and the heads of some approaching to the globular, or rather domical, form; while the heads of others are more conical. The difference in the size of the acorns, and in the length of their footstalks, is as great as the difference in the size of the leaves, and in the length of their footstalks; and wherever Q. sessiliflòra is found growing along with Q. pedunculàta, there are, or appear to be, numerous hybrids produced between these two kinds. The Wyre Forest, near Bewdley, contains upwards of 1200 acres, the greater part of which is the property of W. L. Childe, Esq., whose gardener, Mr. John Pearson, informs us that

both species abound in the forest; and that he could collect a bushel of oak leaves, that would vary in breadth from that of a finger to that of a hand; and from being perfectly sessile, to having a footstalk 2 in. long. He finds hundreds of very distinct varieties; and Mr. Childe's wood-cutter informed him that, in regard to the qualities and appearance of the wood, there are three very distinct sorts, which are called the black, the red, and the white oak. The black oak produces the hardest, and the white oak the softest, timber. Specimens of these three kinds of timber have been sent to us; and though they are taken from trees of not more than a foot in diameter, the difference of the colour of the heart wood is obvious, though certainly not so much as we expected to see it.

⚘ 2. Q. SESSILIFLO'RA *Sal.* The sessile-flowered Oak.

Identification. Sal. Prod., 392.; Smith Fl. Br., No. 2. *a*; Eng. Bot., t. 1845.

Synonymes. Q. Róbur *Willd.*, No. 64., *Ait.*, No. 23., *Lam. Dict.*, 1. p. 717., *N. Du. Ham.*, 7. p. 176.; *Q. R.* var. séssile *Mart. Fl., Rust.*, t. 11.; *Q.* séssilis *Ehrh. Arb.*, 87.; *Q.* platyphýllos, mas et fœm., *Dalech. Hist.*, 2. 3.; *Q.* latifòlia mas, &c., *Bauh. Pin.*, *Raii Syn.*, 440.; *Q.* regàlis *Burnet*; Chêne mâle, *Secondat*, t. iv. f. 1, 2. p. 18.; Chestnut Oak, Bay Oak; Chêne roure or rouvre, Durelin, *Fr.*; Stein Eiche, gemeine Eiche, spät Eiche, Winter Eiche, dürr Eiche, roth Eiche, Berg Eiche, *Ger.*; Quercia vera, *Ital.*; Roble, *Span.*

Derivation. The name of Chestnut Oak is given to this species, because its wood is said to resemble that of the sweet chestnut. Bay Oak, from some fancied resemblance of the leaves to those of the laurel bay. The French names imply the male oak, the red oak, and the hard oak. The German names, the stone oak, the common oak, the late oak, in allusion to its lateness in leafing; the winter oak, from its frequently keeping on its leaves during winter; dry oak, probably from the leaves remaining on the tree after they have become dry and withered; red oak, from the colour of its wood; and hill oak, from its being more abundant on hilly ground than the *Q.* pedunculàta.

Engravings. Eng. Bot., t. 1845.; Mart. Fl. Rust., t. 11.; N. Du Ham., 7. t. 52.; Willd. Abbild., t. 130.; our *fig.* 1572.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves on longish footstalks, deciduous, oblong, smooth; sinuses opposite, rather acute; lobes obtuse. Fruit sessile. Nut oblong. (*Smith.*) Leaves, when young, pubescent beneath. (*Willd.*) A tree, readily distinguished from the preceding species, even at a distance, by the less tufted appearance, and generally paler green, of its foliage during summer; and, in winter, by its less tortuous spray and branches, by its lighter-coloured bark, by its large buds, and by its frequently retaining its leaves, after they have withered, till the following spring. There are trees of this species at Kenwood (which takes its name from the oaks there, being originally Kern Wood, the acorn, or oak, wood); one in the grounds of the Protestant Dissenters' School at Mill Hill, formerly the residence of Peter Collinson; some, according to Martyn, at Norwood, in Surrey; and numerous others at Woburn Abbey, and at Allesley; besides those in Wyre Forest, and in many other places which will be hereafter mentioned. There are also speci-



1572

mens at Messrs. Loddiges's, and in the Horticultural Society's Garden; and, in 1834, there were thousands of young plants in the Milford Nursery. According to Secondat, who wrote in 1785, the kingdom of Naples then boasted of a great many oaks of this species, where it was known under the name of Quercia vera.

Varieties.

⚘ Q. *s.* 2 *pubéscens*; *Q. s.* var β *Smith Eng. Fl.*, vol. iv. p. 150.; *Q.* pubéscens *Willd. Sp. Pl.*, iv. p. 450., *Abbild.*, t. 141., and our *fig.* 1573., *Q. R.* lanuginòsum *Lam. Dict.*, i. p. 717.; the Durmast, *Mart. Fl. Rust.*, t. 12.—Leaves downy beneath. Fruit sessile, but sometimes subsessile. The flowers appear in May, and the fruit ripens in October. Found occasionally in most of the oak woods of Europe; and, according to Willdenow, having the same general appearance, attaining the same height, and living to the same age, as *Q.* sessiliflòra. In

the *Companion to the Botanical Magazine*, it is stated that the forests of Mount Etna consist chiefly of this tree, which also forms some of the woods of the Apennines, at least in the north of Italy. It is easily distinguished at first sight from the common oak, by its inferior dimensions and less twisted stem. Travellers who climb Mount Etna by the usual road from Nicolsi see scarcely any other tree. It is found at an elevation of from about 3200 ft. to 5000 ft. above the level of the sea; and on the eastern side, in the Val del Leone, to 5100 ft. (*Comp. &c.*, i. 91.) Martyn gives the Chêne noir of Secondat, pl. 5., as a synonyme to this variety; but we have satisfied ourselves, from examining the plates in Secondat, that his Chêne noir is the *Q. Taúzin* of Persoon, and Bosc is of the same opinion. Willdenow quotes the Chêne noir of Secondat as a synonyme of his *Q.* pubéscens in his *Berlinische Baumzucht*, ed. 1811, p. 349.; but not in his *Abbildung*, &c., published in 1819. Professor Burnet falls into the same error as Professor Martyn, in considering the *Q.* pubéscens of Willdenow to be the Chêne noir of Secondat, and the Quércus cum lóngi pedículo (alluding to the leaves) of Fougeroux; adding, with Martyn, the synonyme of the Durmast oak; and stating that he thinks the appellation *R*òbur undoubtedly belongs to this species or variety. Whether *Q.* pubéscens *Willd.* and the Durmast oak are synonymes, we are not quite certain, though we have very little doubt on the subject. There is a tree with this name in the Horticultural Society's Garden, which scarcely differs from the species. According to Martyn, there are trees of the durmast oak in the New Forest; and, according to Borrer, also in Sussex.



1573

Other Varieties. Bosc mentions, 1. *le Chêne à Trochets*, or *Chêne à petits Glands*, which has the leaves velvety beneath; 2. *le Chêne à Feuilles découpées*, which has the leaves deeply lobed, and very small; 3. *le Chêne laineux*, or *Chêne des Collines*, which has also the leaves deeply lobed, velvety beneath, and pubescent above; 4. *le Chêne noirâtre*, which has the acorns very large, and almost solitary; and the leaves large, and pubescent beneath. This last variety must not be confounded with the *Q.* nìgra of America, or the Chêne noir of Secondat, which is the *Q. Taúzin*. Bosc also mentions that "he thinks the Chêne mâle of Secondat, the Quércus latifòlia mas quæ brevi pediculo est of Bauhin, different from the chêne mâle, or *Q.* sessiliflòra, of the neighbourhood of Paris." It seems that this variety is known in the Landes under the name of Auzin, or Chêne de malediction; because the country people there believe that any one who cuts down one of these trees, or who sleeps in a house built with any of the timber, will die within the year. Bosc had never seen this variety, though he had traversed the country where it is said to grow. It is described as a low spreading tree, with tortuous branches, of great toughness, and well adapted for ship-building; weighing 75 lb. per cubic foot, and consequently sinking in water. From the name auzin had not Bosc described *Q. Taúzin* separately, we should have supposed this kind to be that species. *Le Chêne de Haies* is also mentioned by Bosc, under the head of *Q.* sessiliflòra, as common on the Jura, and in the mountains of the Vosges, where it is planted for hedges, seldom growing above the height of 6 ft. or 8 ft. The shoots are used for basket-making and tying bundles. The leaves are like those of *Q.* pedunculàta, but the acorns are sessile. It is said not to change its nature by transplantation; and hence Bosc thinks that it may be a distinct species. (*Nouv. Cours d'Ag.*, art. Chêne.)

In Britain, the varieties are very numerous, though none has hitherto received a technical designation, except the durmast, just described; respect-

ing which name Mr. Atkinson observes (*Hort. Trans.*, 2d s., vol. i. p. 336.), that the woodmen in the New Forest call all the oaks that have dark-coloured acorns dunmast (of which word durmast is supposed to be a corruption); and that dun-coloured acorns are found both on *Q.* pedunculàta and *Q.* sessiliflòra. A variety of *Q.* sessiliflòra was found by Mr. Borrer in North Devon, with large leaves, oblique at the apex, as shown in *fig.* 1574. These leaves are not quite so long as those of one of Mr. Bree's varieties (*fig.* 1584.), which differ from Mr. Borrer's in being pointed at the apex. The only account which we are aware of, that has been given of other British varieties of *Q.* sessiliflòra, is that by the Rev. W. T. Bree, in the *Gardener's Magazine*, vol. xii. p. 571. The varieties there mentioned were all found at Corley, in the parish of Allesley. Mr. Bree's communication was accompanied by 15 dried specimens, 5 of which we have figured, and the rest shortly described.


1574

"When you examine these specimens," Mr. Bree observes, "I think you will come to the conclusion that our two so-called species of oak are mere varieties; but, though there are sessile oaks bearing fruit on peduncles, and pedunculated oaks bearing almost sessile fruit, there is yet a certain undescribable something about the trees, by means of which I can always distinguish each, without minutely examining either the acorns or the leaf-stalks. There is little difference in the general form and outline of the two trees when full grown; but young seedlings of *Q.* sessiliflòra bear their leaves close to the stem, and not on footstalks; so that, in this stage of their growth, it is difficult to distinguish them from *Q.* pedunculàta. *Q.* sessiliflòra generally bears small acorns; but it sometimes produces very fine large ones. The acorns, when ripe, have very generally a red or pinkish tinge; so that, in nine cases out of ten, they are distinguished by looking at the fallen acorns only." The specimens which accompanied Mr. Bree's communication are thus described:—

"Q. *s.* 1.—Acorns large, ovate, quite sessile, and growing in clusters of four or five. Leaves from 5 in. to 5¾ in. in length.

"Q. *s.* 2.—Acorns large, quite sessile, and growing singly, or in clusters of two or three, as in the preceding specimen, but closer together on the branches.

"Q. *s.* 3.—Very large leaves, and very small long acorns; one of the latter sessile, and the other with a footstalk, of about 3-8th in. in length

"Q. *s.* 4.—Acorns of three times the diameter of those of the last specimen, and about twice their length.

1575



"Q. *s.* 5.—Acorns with a short peduncle. Two specimens from the same tree. In one specimen, the peduncles are 1 in. long; in the other, scarcely ½ in. The form of the leaves, their yellowish green and long footstalks, and the large buds in their axils, leave no doubt whatever of these specimens belonging to *Q.* sessiliflòra.

"Q. *s.* 6.—Acorns single, or in clusters of from two to five, on peduncles varying from ¼ in. to 1 in. in length. One of the peduncles has an abortive sessile acorn at its base; two acorns, about ½ in. from each other on its length; and its extremity terminates in a large well-formed leaf-bud. The acorns are long, and very much resemble those of *Q.* pedunculàta.

"Q. *s.* 7.—Acorns small and round, sessile in some cases, but with short footstalks in others; the leaves of a darker green, approaching nearer to those of *Q.* pedunculàta than in the case of any of the preceding specimens; though, from their appearance, long footstalks, and large buds, there can be no doubt of their belonging to *Q.* sessiliflòra.

"Q. *s.* 8.—Leaves but little laciniated, and resembling those of *Q.* pedunculàta; broad, with long footstalks, pale green. (See *fig.* 1575.)

" Q. *s.* 9.—Acorns on a very short peduncle. Leaves with an unusually long petiole, of a darker green, much narrower in proportion to their length than in any of the preceding varieties (See *fig.* 1576.)

" Q. *s.* 10.—Leaves regularly and deeply laciniated, regularly notched, and almost serrated. A totally different specimen from any of the preceding ones. (See *fig.* 1577.)

1576



1577



" Q. *s.* 11.—The peduncles 1 in. in length, in some cases clothed with acorns on the sides, and with a terminal one; some solitary and quite sessile. A very handsome and remarkable specimen. The acorns long, like those of *Q.* pedunculàta.

" Q. *s.* 12.—Acorns on peduncles ½ in. in length; the acorns long, but the foliage and buds decidedly those of *Q.* sessiliflòra.

" Q. *s.* 13.—Acorns very long and pointed, sessile. Leaves numerous, of a darker green than usual. A very remarkable variety. (See *fig.* 1578.)

" Q. *s.* 14.—Acorns round, and on short peduncles. Leaves broad, and yellowish green.

" Q. *s.* 15 *hýbrida.*—Acorns on very short peduncles, and petioles longer than usual; thus

1578



1579



approaching to *Q.* sessiliflòra, yet resembling a true *Q.* pedunculàta. There is something in the leaves, in their rather long petioles, and in the large buds in their axils, which reminds us of *Q.* sessiliflòra; but still, taking the slenderness of the wood, the colour of the leaves, their form, their number, the small buds, and the great length of the acorn, the specimen appears to belong to *Q.* pedunculàta. This specimen, Mr. Bree

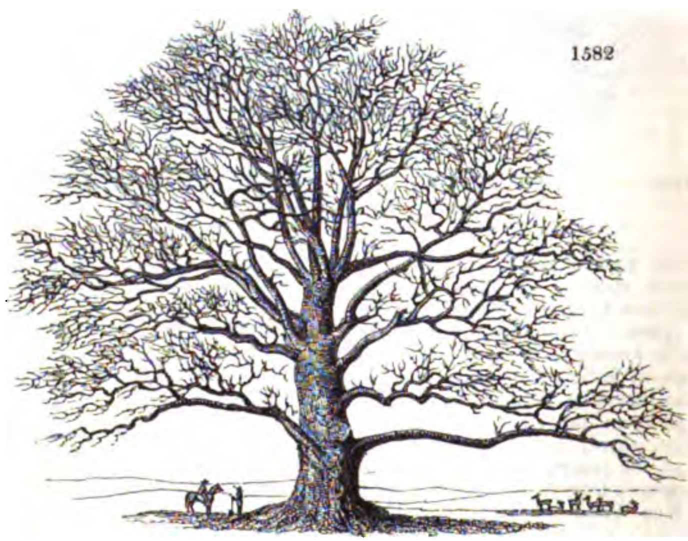
1581



Q. pedunculàta at Studley Park.
Height 80 ft.; girt of the trunk 24 ft. 6 in.; diameter of the head 91 ft.

species as pyramidal, fastigiate, or orbiculate, as ever we have found any of the other. In proof of this, we may refer to *fig.* 1581. and *fig.* 1582., which are portraits, by that accurate and able artist H. W. Jukes, Esq., of two of the largest trees of Q. pedunculàta in Studley Park, Yorkshire, drawn to a scale

1582

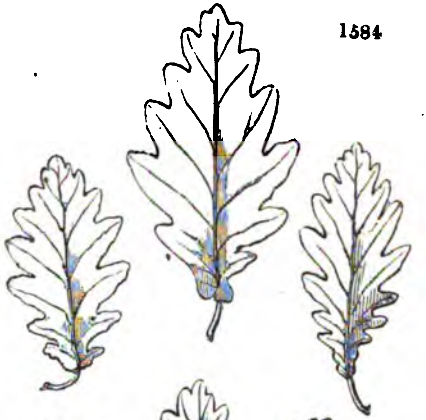


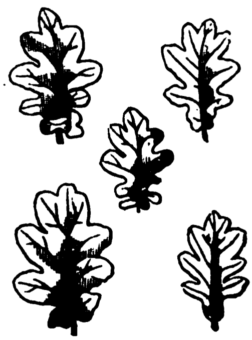
Q. pedunculàta at Studley Park.
Height 78 ft.; girt of the trunk 29 ft.; diameter of the head 87 ft.

1583



1584







of 1 in. to 39 ft.; and to *fig.* 1585. and *fig.* 1586., portraits of two of the largest trees of Q. sessiliflòra in the same park, drawn to the same scale, and by the same artist. The difference in aspect, however, both when the trees are clothed, and when they have lost their leaves is considerable. The difference in the leaves will be rendered obvious by comparing *fig.* 1583., which represents Q. pedunculàta, with *fig.* 1584., which represents Q. sessiliflòra. The branches and spray of Q. sessiliflòra are somewhat less tortuous and gnarled than those of Q. pedunculàta; the bark is whiter, the shoots of the year rather thicker, and the buds decidedly larger. Q. pedunculàta comes rather earlier into leaf than Q. sessiliflòra: the flowers appearing in the former in the beginning of May, and the fruit ripening in the beginning of October; while in the latter the flowers appear in the middle of May, and the fruit ripens in November. The leaves of Q. sessiliflòra are said by some to be more frequently retained on the tree through the winter than those of Q. pedunculàta; and hence, it is alleged, the German name of winter eiche for the former, and sommer eiche for the latter: but Willdenow truly observes that trees may frequently be found among both species which retain their leaves, in a withered state, during the winter. The taproots in both, when young, and in good, deep, loamy or sandy, soil, have been traced to a depth nearly as great as the height of the tree. (*Hanbury* and *Marshall.*) The lateral roots do not run so near the surface of the ground as those of many other kinds of trees, unless the soil is thin and bad. They may sometimes be found several feet under ground, attaining a great thickness, and extending to a much greater length than the branches. The roots of the British oaks never throw up suckers. The rate of growth of the two species does not appear to be very

1585



Q. sessiliflòra at Studley Park.

Height 118 ft.; girt of trunk 33½ ft.; diameter of the head 96 ft.

different, though it is generally alleged that plants of *Q.* sessiliflòra grow faster, and they certainly have a more robust appearance, than those of *Q.* pedunculàta, when of six or eight years' growth; for which reason Mr. Brees considers it the best species for copse wood. (See *Gard. Mag.*, vol. xii. p. 572.) Willdenow observes, also, that *Q.* pedunculàta is the tenderer of the two when young, which may result from its coming earlier into leaf. The growth of both species, in about 10 years from the acorn, in good soil, in the climate of London, may be stated as from 15 ft. to 18 ft., or even more, if extra preparation were given to the soil. Both will attain the height of 50 ft. in 30 years, which may be considered the average height of the species in ordinary soils in England; but, in deep loamy soils, both attain the height of 100 ft. and upwards. The stem of the oak, Marshall observes, is naturally short; and, if left to itself, the tree, in an open situation, will generally feather to the ground. It has not the upright growth of the ash, the elm, and the pine tribe: nevertheless, by judicious training, or by planting in close masses, the oak will acquire a great length of stem; in this case, however, it rarely swells to any considerable girt. There are many hundreds of oak trees, we are informed, in the government plantations in the Forest of Dean, which

1586



Q. sessiliflòra at Studley Park.

Height 95 ft.; girt of the trunk 16 ft. 1 in.; diameter of the head 82 ft. 9 in.

have been planted in masses within the present century, and never in the slightest degree pruned, and which have yet straight stems, upwards of 60 ft. high. The largest tree of *Q.* sessiliflòra now standing in England, that we have had any account of, is that in Studley Park, Yorkshire, of which *fig.* 1585. is a portrait, to the scale of 1 in. to 30 ft., and which is 118 ft. high. The highest existing tree of *Q.* pedunculàta, that we have heard of, is one at Tibberton Park, in Herefordshire, of which *fig.* 1587. is a portrait, to the scale of 1 in. to 50 ft., and which is 108 ft. high. We have accounts of several other oaks, upwards of 100 ft. high; but we know not to which species they belong. It is not known that there is any difference in the longevity of the two kinds; there being examples of both which must be upwards of 200 or 300 years old. There are several oaks in England which are from 500 to 1000 years old, or upwards; but, in most cases, we have not been able to ascertain to which species they belong.

Geography. The British oak is a native of most parts of Europe, from Sweden to the Mediterranean; of the north of Africa; and of the west of Asia: and *Q.* pedunculàta appears to be the more prevalent species; especially in the middle and northern regions. In Britain, the *Q.* pedunculàta is by far the more common: but *Q.* sessiliflòra is found in various places throughout the island; for example, in addition to those already mentioned (p. 1736.), near Cuckfield, at Cowfold, and in different parts of St. Leonard's Forest, at Coalhurst near Horsham, and at Goodwood, in Sussex. Mr. Borrer, who has given us these localities, adds: " There is abundance of it about Tunbridge; and I particularly recollect it near Dalgelly; and in profusion, and varying much in its foliage, in some parts of Devonshire, and espe-

cially along the Torridge, from Torrington to Bideford; and about Clovelly. In those parts is a variety with the leaf of a very large size (see *fig.* 1574. in p. 1738.); and I recollect a tree in Clovelly Park with all the leaves oddly recurved at the edges, so as to have a convex disk. I recollect, also, some very ancient pollards, with leaves of great size, near Invercastlie, on the Ross-shire side of Strath Oikell. I think the species is common in Scotland. I presume an oak with a long, narrow, ragged leaf, which I happen to have seen only at Chepstow Castle, where there are several trees, probably all planted, and where it is called Maiden oak, is a var. of Q. sessiliflòra." (*W. B. Jan.* 1837.) Mr. Bree says that in some parts of North Wales, and in the neighbourhood of the lakes in the north of England, Q. sèssiliflòra is the more prevailing kind of oak; constituting, as it were, the staple growth of the country, almost to the exclusion of Q. pedunculàta. Great part of the Forest of Ardennes, in Warwickshire, he says, consists almost entirely of Q. sessiliflòra, of which there are specimens which exhibit marks of great antiquity. (*Gard. Mag.*, vol. xii. p. 572.) Q. sessiliflòra is said by Bosc to be the more abundant species in the forests in the neighbourhood of Paris, where it forms a lower and more spreading tree than Q. pedunculàta; which, however, is said to be the more common oak of France. In Germany, if we may judge from the name for Q. sessiliflòra, gemeine eiche, it would appear to be the more common; and we are informed by German gardeners that this is the case. We have seen both sorts in the Black Forest, in the neighbourhood of Donaueschingen. Mr. Atkinson states that he received acorns of three varieties of oaks from a botanist who collected them in the Black Forest; and that he had, in 1833, plants of them 6 ft. high, which did not exhibit any difference from Q. pedunculàta and Q. sessiliflòra. The oak is never found of any size except in deep loamy soil; and in a low, or only moderately elevated, situation. It never grows in marshy soil. In gravelly or sandy soil, or in shallow soil on rock, it forms a small stunted tree, and on mountains a shrub. In England, it is found on soils superincumbent on chalk, sandstone, and limestone; thriving equally well on each, according to the depth and quality of the surface soil. In Scotland, it is found in the clefts of granite rocks, basalt, sandstone, and every other description of native rock, where the soil over it is of any depth, and not saturated with water. In Germany, it has been observed by Willdenow that Q. pedunculàta requires rather better soil than Q. sessiliflòra.



1587

History. The earliest notices which we have of the oak in Britain are in the *Saxon Chronicles*, from which it appears that oak forests were chiefly valued for the acorns which they produced, which were generally consumed by swine and other domestic animals, but, in years of great scarcity, were eaten by man. "Famines," Burnet observes, "which of old so continually occurred, history in part attributes to the failure of these crops. Long after the introduction of wheat and oats and rye, nay, little more than 700 years since, when other food had in a great measure superseded the use of mast, considerable reliance was still placed thereon, and oaks were chiefly valued for the acorns they produced. In the *Saxon Chronicles*, that year of terrible dearth and mortality, 1116, is described as 'a very heavy-timed, vexatious, and destructive year,' and the failure of the mast in that season is particularly recorded: — 'This year, also, was so deficient in mast, that there never was heard such in all this land, or in Wales." (*Amœn. Quer.*, fol. 1.) About the end of the seventh century, King Ina, among the few laws which he enacted to regulate the simple

economy of our Saxon ancestors, gave particular directions relating to the fattening of swine in woods, since then called pannage, or pawnage. (*Mart. Mill.*) The same king made injuring or destroying trees penal; and those who did so clandestinely were fined thirty shillings, the very sound of the axe being sufficient conviction; and the man who felled a tree under whose shadow thirty hogs could stand incurred a double penalty, and was mulcted to sixty shillings. (*Hunter's Evelyn.*) In a succeeding century, Elfhelmus reserves the pannage of two hundred hogs for his lady, in part of her dower; and mast is particularly mentioned, about the middle of the eleventh century, in a donation of Edward the Confessor. It appears from the *Domesday Book*, that, in William the Conqueror's time, oaks were still esteemed principally for the food they afforded to swine; for the value of the woods, in several counties, is estimated by the number of hogs they would fatten. The survey is taken so accurately, that in some places woods are mentioned of a single hog. (*Mart. Mill.*) The rights of pannage were greatly encroached on by the Norman princes, in their zeal for extending forests for the chase; and this was one of the grievances which King John was obliged to redress in the charter of the liberties of the forest. (*Chron. Sax.*)

The number of oak forests which formerly existed in Britain is proved by the many names still borne by British towns, which are evidently derived from the word oak. "For one Ash-ford, Beech-hill, Elm-hurst, or Poplar," Burnet remarks, "we find a host of oaks, Oakleys, Actons, Acklands, Aken hams, Acringtons, and so forth. The Saxon ac, aec, aac, and the later ok, okes, oak, have been most curiously and variously corrupted. Thus we find ac, aec, degenerating into ak, ack, aike, ack, acks, whence ax, exe; often, also, aspirated into hac, hace, and hacks. In like manner, we trace oak, oke, ok, oc, ock, œck, ocke, oks, ocks, ockes, running into oax, ox, oxes, for ox, oxs, with their farther corruptions, auck, uck, huck, hoke, and wok. As an example of this last extreme, the town Oakingham, or Ockingham, is at this day called and spelt indifferently Oakingham, Okingham, or Wokingham; and Oaksey or Oxessey are two common ways of writing the name of one identical place. Oakham, Okeham, Ockham, and Wockham, Hokenorton on the river Oke, Woking in Surrey, Wacton in Herefordshire and Norfolk, Okey or Wokey in Somersetshire, Oakefield or Wokefield in Berkshire, and Old or Wold in Northamptonshire, with the provincial Whom or Whoam, are other similar corruptions." (*Amœn. Quer.*, fol. 11.)

The history of the use of the British oak in building, carpentry, and for naval purposes, is necessarily coeval with that of the civilisation of the British islands. The timber found in the oldest buildings is uniformly of oak. Professor Burnet possessed a piece of oak from King John's Palace at Eltham, perfectly sound, fine, and strong, which can be traced back upwards of 500 years. The doors of the inner chapels of Westminster Abbey are said to be coeval with the original building; and if by this is meant Sibert's Abbey of Westminster, which was founded in 611, they must be more than 1200 years old. The shrine of Edward the Confessor, which must be nearly 800 years old, since Edward died in 1066, is also of oak. One of the oaken coronation chairs in Westminster Abbey has been in its present situation about 540 years. "In the eastern end of the ancient Chapel of St. Stephen, in the Castle of Winchester, now termed the County Hall, is Arthur's round table, the chief curiosity of the place. It bears the figure of that Prince, so famous in the old romances, and the names of several of his knights, Sir Tristram, Sir Gawaine, Sir Gerath, &c. Paulus Jovius, who wrote between 200 and 300 years ago, relates that this table was shown by Henry VIII. to his illustrious visiter the Emperor Charles V., as the actual oaken table made and placed there by the renowned British Prince, Arthur, who lived in the early part of the sixth century; that is, about 1030 years ago. Hence the poet Drayton sings, —

> 'And so great Arthur's seat ould Winchester prefers,
> Whose ould round table yet she vaunteth to be hers.'

Some antiquarians, however, state that the tabulæ rotundæ were introduced into this country by Stephen, and believe that the table in question was made by him, which in that case would diminish its age 600 years; leaving it, however, above seven centuries to boast of; enough to render it a most valuable and interesting monument. It has been perforated by many bullets, supposed to have been shot by Cromwell's soldiers. (*Grose* and *Hutchins*.) The massive tables, paneled wainscots, and ceiling of Morton Hall, Cheshire; the roofs of Christ-Church, Oxford, and Trinity College, Cambridge, are fine specimens of old oak. In Gloucester Cathedral, also, are thirty-one stalls of rich tabernacle work on either side, little inferior in point of execution to the episcopal throne at Exeter, or to the stalls at Ely; erected in the reign of Edward III., and allowed to be among the finest pieces of carving in wood now remaining in England of that early date. (*Britton*.) Of about equal age were the carved figures of Edward III. and his Queen Phillippa, in the collegiate church and hospital of St. Catherine, lately removed from the tower to St. Catherine's newly built church and hospital, in the Regent's Park. The screens, stalls, seats, &c., in the old church were all of oak, beautifully carved, and very ancient; the old oaken pulpit, also, which now adorns the new structure, was the donation of Sir Julius Cæsar, A.D. 1621. The rich carvings in oak which ornamented the King's room in Stirling Castle were executed about 300 years ago, and are many of them still in good preservation in the collections of the curious. In digging away the foundation of the old Savoy Palace, London, which was built upwards of 650 years since, the whole of the piles, many of which were of oak, were found in a state of perfect soundness, as, also, was the planking which covered the pile heads. (*Tredgold*.) Buffon mentions the soundness of the piles of the bridge which the Emperor Trajan built across the Danube; one of which, when taken up, was found to be petrified to the depth of three quarters of an inch, but the rest of the wood was little different from its ordinary state. And of the durability of oak timber, the oldest wooden bridge of which we have any account, viz. that one famous from its defence by Horatius Cocles, and which existed at Rome in the reign of Ancus Martius, 500 years before Christ, might be given as another example. The piles which supported the buttresses, and immense uncouth starlings which confined the waterway and so greatly disfigured old London Bridge, were some of them of oak; and I [Professor Burnet] have a specimen of one, which is far from being in a rotten state: and the still older piles on which the bridge piers rested were also in a very strong and sound condition: nay, those stakes which it is said the ancient Britons drove into the bed of the Thames to impede the progress of Julius Cæsar, near Oatlands, in Surrey, some of which have been removed for examination, have withstood the destroyer time nearly 2000 years." (*Amœn. Quer.*, fol. 7.) In Cambden's time, the place where these stakes were found was called Cowey Stakes. In the *Vetusta Monumenta*, vol. ii. pl. 7., is a sketch of an old wooden church at Greenstead, near Ongar, the ancient Aungare, in Essex. The inhabitants have a tradition, that the corpse of a dead king once rested in this church; and it is believed to have been built as a temporary receptacle for the body of St. Edmund (who was slain A. D. 946), and subsequently converted into a parish church. The nave, or body, which renders it so remarkable, is composed of the trunks of oaks, about 1 ft. 6 in. in diameter, split through the centre, and roughly hewn at each end, to let them into a sill at the bottom, and a plank at the top, where they are fastened by wooden pegs. The north wall is formed of these half oaks, set side by side as closely as their irregular edges will permit. In the south wall there is an interval left for the entrance; and the ends, which formerly were similar, have now to the one a brick chancel, and to the other a wooden belfry, attached. The original building is 29 ft. 9 in. long, by 14 ft. wide, and 5 ft. 6 in. high on the sides, which supported the primitive roof. The oaks on the northern side have suffered more from the weather than those on the southern side; but both are still so strong, and internally so sound, that, although "corroded and worn by

time," having been beaten by the storms for nearly a thousand winters, they promise to endure a thousand more. (*Ibid.*)

The ancient Britons appear to have first used the oak for ship-building; the alder (see p. 1680.), the cypress, the pine, &c., having been previously used for that purpose by the Romans. The Britons, indeed, appear to have possessed a species of navy almost from the earliest period of their existence as a nation. The ancient name of Britain, according to the Welch bards, was Clas Merddin, "the sea-defended green spot;" and we read, that, before the invasion of Britain by Julius Cæsar (52 B.C.), a naval engagement took place between the Romans and the Veneti, aided by the Britons, or Cymry, in which the vessels of the latter are said to have been so firmly constructed, that the beaks of the Roman ships could with difficulty make any impression on them. These vessels were built of oaken planks, their sails were made of skins, and their anchors were attached to iron chains, or cables. The Saxons, who settled in Britain about the middle of the fifth century, were famed for their piracies at sea, and seem to have kept up a formidable marine. Their vessels, we are told by Aneurin, a Welch bard, "were single-masted, carrying one square sail. They had curved bottoms, and their prows and poops were adorned with the heads and tails of monsters." (See *Saturday Magazine*, vol. iv. p. 73.) King Alfred, who ascended the throne in 872, had numerous vessels, some of which carried sixty oars; and his enemies the Danes were also celebrated for their ships. The English vessels, at this period, are known to have been of oak; and that the Danish ones were built of the same timber is extremely probable. Professor Burnet, writing on this subject, says, "An ancient vessel was discovered, some years ago, in a branch of the river Rothen, near the west end of the Isle of Oxney, in Kent, and about two miles from the spot where formerly stood the Roman city of Anderida. The timber of which this vessel was constructed is oak, perfectly sound, and nearly as hard as iron; and some persons believe it to be one of the fleet abandoned by the Danes after their defeat in the reign of Alfred. This, however, is but conjecture: still, whether it be so, or whether it be a wreck of some Danish pirates, it must have lain there many centuries. (*Lit. Reg.*) Sir Joseph Banks records, in the *Journal of Science* (vol. i. p. 244.), the following account of an ancient canoe found in Lincolnshire in April, 1816, at a depth of 8 ft. under the surface, in cutting a drain parallel with the river Witham, about two miles east of Lincoln, between that city and Horsley Deep. It seems hollowed out of an oak tree: it is 30 ft. 8 in. long, and measures 3 ft. broad in the widest part. The thickness of the bottom is between 7 in. and 8 in. Another similar canoe was discovered in cutting a drain near Horsley Deep; but it was unfortunately destroyed by the workmen before it was ascertained what it was. Its length was nearly the same as the former, but it was 4½ ft. wide. Besides these, three other canoes, resembling the above in construction, have been found in the same county: one in a pasture near the river Trent, not far from Gainsborough; and two in cutting a drain through the fens below Lincoln. One of these is deposited in the British Museum. Conjecture alone can be indulged with regard to the probable age of these three canoes; but the fact of their being hollowed out of the trunks of old trees must carry them back to a very early date, and establish their extreme antiquity. Long before the time of Alfred, the Britons were familiar with ships regularly built: vessels such as these are found only amongst the rudest people, and in the earliest stages of society; and the epoch when any of the European nations used such canoes must be remote indeed." (*Amœn. Quer.*) The fleet of King Edgar, however, appears to have consisted chiefly of boats; and, though that of William the Conqueror, amounting to 900 vessels, with which he invaded England in 1066, is said to have consisted of ships, the representations extant of them bear but little resemblance to our men-of-war. William set great value on his navy, and was the monarch who first gave exclusive privileges to the Cinque Ports. John was the first who asserted the exclusive right of the English to the dominion of the seas; and, in

1214, issued a mandate to his chief admiral, ordering him to arrest, seize, and make prizes of all ships whatever found therein. In the reign of Edward I., the first admiral was appointed; and, about 1380, cannons were first used on board ships. The first three-masted vessel was built by Henry VII.; and Henry VIII. not only built many fine ships, but established the royal dockyards of Woolwich, Deptford, and Portsmouth; and made laws for the planting and preservation of oak timber. He was also the last English monarch who employed foreign hired ships of war. Elizabeth and James greatly encouraged the navy, and the planting of oak timber; and Charles I., in 1635–37, built a magnificent vessel, called the Sovereign of the Seas, an oak used in constructing which produced four beams, each 44 ft. in length, and 4 ft. 9 in. in diameter. This ship, which was afterwards called the Royal Sovereign, was destroyed by fire at Chatham in 1696, after having been upwards of sixty years in the service. (See *Sat. Mag.* for 1834.)

It is difficult to assign any exact date for the period when oak plantations were first made for profit. According to popular tradition, William Rufus was the first who is recorded to have planted oak trees, when, in 1079, he formed the New Forest in Hampshire. But Gilpin appears to think that it is much more probable that he merely thinned out chases in the woods already existing, than that he planted fresh trees. The district of Ytene, indeed, appears to have been a forest in the time of the Saxons; and, from the poorness of its soil, to have been thinly populated. Henry of Huntingdon, and the other monkish writers, who relate that William destroyed about fifty parish churches, and as many villages, extirpating their inhabitants to make this forest, were therefore probably guided more by their hatred to the Norman monarch, than by a strict adherence to truth. Henry I. enlarged the New Forest, enacting severe laws for securing the timber in that and other woods; and he appointed proper officers to enforce these laws, and to preserve the royal forests from decay. In Henry II.'s time, England appears to have been nearly covered with wood, consisting principally of oak trees; and Fitzstephen tells us that a large forest lay round London, "in the coverts whereof, lurked bucks and does, wild boars and bulls." As civilisation advanced, these woods became partially cleared away; and those which remained were called the Royal Forests, and were retained for the purpose of sheltering game for the diversion of the kings. Henry II. gave a right to the Cistercian Abbey of Flaxley, in the neighbourhood of the Forest of Dean, to erect an iron forge, together with liberty to cut two oak trees weekly, to supply it with fuel. But Henry III. revoked this latter grant, as being prejudicial to the forest; and a wood, called the Abbot's Wood, was gifted to the abbey in lieu of it. (See *Lauder's Gilpin*, vol. ii. p. 67.) An inquisition was held, in the reign of Henry II., respecting Sherwood Forest, by which it appears that the right of hunting in it was then considered of great importance; and an act was passed, in the reign of Henry III. (1231), to define its boundaries. The Forest of Salcey was also formerly one of great importance, and it is frequently mentioned in the forest laws of different English kings. The forest of Norwood, and several others, were entirely of oak, and, of course, valuable as producing naval timber; but the two great forests for this purpose were the New Forest and the Forest of Dean. Among all the laws that were passed at different times for regulating the forests, as late as the reign of Henry VII., there appears to have been none enjoining planting; the cares for the preservation of the forests being chiefly confined to directions as to the proper age and season for felling the trees. Forests, indeed, were so abundant, even in the reign of Henry VII., that we are told by Polydore Virgil that they covered one third part of all England; and the efforts of the people must have been rather directed towards clearing away trees than planting them. About the time of Henry VIII., when, as we have already seen, the use of hired foreign ships of war was discontinued, and several English vessels were built of large size, the first fears respecting a scarcity of oak timber appear to have been felt. Tusser, who wrote about 1562, complains that "men were more studious to

cut down than to plant." The statute of Henry VIII., c. 35., appears to be the first on record which enjoins the "replantation of forest trees, to cure the spoils and devastations that have been made in the woods;" and the plantations thus made appear to have been enclosed, as Tusser says in his directions for April, —

> "Fence coppice in,
> Yer hewers begin."

And again, —

> "Sow acornes, ye owners that timber do love;
> Sow hay and rie with them, the better to prove:
> If cattle or coney may enter the crop,
> Young oak is in danger of losing his top."

In the reign of Elizabeth, a work was published on *Forest Law;* in which its author, Manwood, tells us that "the slender and negligent execution of the forest law hath been the decay and destruction (in almost all places within this realm) of great wood and timber; the want whereof, as well in this present time as in time to come, shall appear in the navy of this realm." (*Manwood on Forest Law*, c. ii. 6.) In consequence of this, or some previous representations, fresh laws were enacted (13 Eliz.) for the preservation and restoration of the royal woods. In the reign of James I. (in 1611), Arthur Standish published his celebrated *Commons' Complaint, wherein is contained two special Grievances;* the first of which is, "the generall destruction and waste of woods in this kingdome, with a remedy for the same; also, how to plant wood according to the nature of any soyle," &c. To this work is appended a kind of mandate:—"By the king, to all noblemen, and other our loving subjects to whom it may appertain. Whereas, Arthur Standish, gentleman, hath taken much pains, and been at great charges in composing and publishing in a book some projects for the increasing of woods, the decay whereof in this realm is universally complained of; and, therefore, we would be glad that any intention might further the restoring thereof; we have therefore been pleased to give allowance to his book, and to the printing thereof. And if the same shall be willingly received of such of the gentlemen, and others of ability, who have grounds fitting for his projects, it shall much content us; doubting not but that such as shall think good to make use of the book will deal worthily with him for his pains. And we are also pleased, for the better encouragement of the said Standish, hereby to declare, that our pleasure is, that no person or persons whatsoever shall print any of the said books, but for and to the use of the said Standish, and none others. Given under our signet at Andover, the first day of August in the ninth year of our reign of England, France, and Ireland, and of Scotland the five-and-fortieth. God save the king."

In the same reign (1612), another book was published, entitled "*An Olde Thrift newly revived;* wherein is declared the manner of planting, preserving, and husbanding young trees of divers Kindes for Timber and Fuell; and of sowing Acornes, Chesnuts, Beech-mast, the Seedes of Elmes, Ashen-keyes, &c." In this work are given directions for planting acorns, and rearing and protecting the young trees; and the abuses in the management of the royal woods are pointed out. The necessities of Charles I. induced him to make ruinous grants of the royal woods to any person who would supply him with money; and, in the civil wars which followed, many of the forests were nearly destroyed. In the reign of Charles II., an order was issued under the king's "sign manual to Sir John Norton, woodward of the New Forest, to enclose 300 acres of waste, as a nursery for young oak; the expense of which was to be defrayed by the sale of the decayed wood. This order bears date December 13. 1669. But, though the enclosure here specified was trifling in itself, yet it had the merit of a new project, and led to farther improvements." (*Gilpin's For. Scen.*, vol. ii. p. 29.) These improvements, however, are not stated; and no permanent regulation appears to have been made till the reign of William III., when a statute was passed (Will. 10.) empowering certain commissioners to enclose 2000 acres in the New Forest for the growth of naval timber; and 200 more every year for the space of 20 years. From this period, go-

vernment plantations of about 6000 acres of young trees have always, nominally at least, been kept up; new pieces of ground being enclosed as the part already planted became sufficiently advanced to be thrown open to the forest. An act passed in 1800 remedied many previously existing abuses; and the plantations are now in a flourishing state. (See Part IV.)

In France and Germany, the oak is one of the principal trees that have been subjected to cultivation; and, in the oldest accounts on record respecting artificial plantations, the oak is mentioned as the object of especial attention. In France it is more attended to than in Germany, on account of the fleet which that country has possessed for many centuries. The timber for the French navy has not only for many centuries been obtained from the oaks in the national forests, but even to the present day there is a law by which every private individual who possesses an oak tree of certain dimensions, considered to be fit for constructing the larger kinds of ships of war, is obliged, when he intends to cut it down, to make the first offer of it to government. In Baudrillart's *Dictionnaire des Eaux et Forêts* will be found numerous regulations respecting the common oak, all proving how much its timber is valued beyond that of all other trees in France. After having thus given what may be called the economical history of the common British oak, we shall next say a few words respecting its legendary history in the British Islands, and its biography.

Legendary History. The oak appears to have been an object of worship among the Celts and ancient Britons. The Celts worshipped their God Teut under the form of this tree; and the Britons regarded it as a symbol of their god Tarnawa, the god of thunder. According to Professor Burnet, from Hu (the Bacchus of the druids) came the word Yule; but others derive it from Baal, Bel, or Yiaoul, who was the Celtic god of fire, and was sometimes identified with the Sun, and was also worshipped under the form of an oak. Baal was considered the same as the Roman Saturn, and his festival (that of Yule) was kept at Christmas, which was the time of the Saturnalia. The druids professed to maintain perpetual fire; and once every year all the fires belonging to the people were extinguished, and relighted from the sacred fire of the druids This was the origin of the Yule log, with which, even so lately as the commencement of the last century, the Christmas fire, in some parts of the country, was always kindled; a fresh log being thrown on and lighted, but taken off before it was consumed, and reserved to kindle the Christmas fire of the following year. The Yule log was always of oak; and, as the ancient Britons believed that it was essential for their hearth fires to be renewed every year from the sacred fire of the druids, so their descendants thought that some misfortune would befall them if any accident happened to the Yule log. (See Irving's *Bracebridge Hall.*) The worship of the druids was generally performed under an oak; and a heap of stones was erected, on which the sacred fire was kindled, which was called a cairn, as Professor Burnet says, from kern, an acorn. The mistletoe was held in great reverence; and, as it was not common on the oak, solemn ceremonies attended the search for it. The druids fasted for several days, and offered sacrifices in wicker baskets or frames; which, however, were not made of willow, but of oak twigs, curiously interwoven; and were similar to that still carried by Jack in the Green on May-day, which, according to Professor Burnet, is one of the relics of druidism. When all was prepared for the search (the mistletoe having been, no doubt, previously found by some of the assistants), the druids went forth, clad in white robes, to search for the sacred plant; and, when it was discovered, one of the druids ascended the tree, and gathered it with great ceremony, separating it from the oak with a golden knife. The mistletoe was always cut at a particular age of the moon, at the beginning of the year, and with the ceremonies already detailed under the head of *Viscum* (see p. 1022.); and it was only sought for when the druids had had visions directing them to seek it. When a great length of time elapsed without this happening, or if the mistletoe chanced to fall to the ground, it

was considered as an omen that some great misfortune would befall the nation. According to Davies's *Celtic Researches and Inquiry into the Mythology of the Druids*, the apple tree was considered as the next sacred tree to the oak, and orchards of it were always planted near a grove of druids' oaks. This was also favourable to the production of the mistletoe, as it grows abundantly on the apple tree, and might be easily propagated by birds, or any other accidental mode of transporting the seed. The well-known chorus of "Hey derry down," according to Professor Burnet, was a druidic chaunt, signifying, literally, "In a circle the oak move around." Criminals were tried under an oak tree; the judge being placed under the tree, with the jury beside him, and the culprit placed in a circle made by the chief druid's wand. The Saxons also held their national meetings under an oak; and the celebrated conference between the Saxons and the Britons, after the invasion of the former, was held under the oaks of Dartmoor. The wood of the oak was appropriated to the most memorable uses: King Arthur's round table was made of it, as was the cradle of Edward III., when he was born at Caernarvon Castle; this sacred wood being chosen, in the hope of conciliating the feelings of the Welch, who still retained the prejudices of their ancestors, the ancient Britons. It was considered unlucky to cut down any celebrated tree: and Evelyn gravely relates a story of two men who cut down the Vicar's Oak, in Surrey; one losing his eye, and the other breaking his leg, soon after.

Biography of the Oak. Several individual oak trees are connected with historical facts or legends, or are remarkable for their age, size, or other circumstances; and we shall now give a short account of the most celebrated in each county, arranging the counties in alphabetical order.

Bedfordshire. The Abbot's Oak, at Woburn Abbey, which may be called an English dool tree, is a low pollard-like tree, with nothing remarkable in its appearance, though the associations connected with it are extremely interesting. On the branches of this tree, according to Stowe and other historians, exactly three centuries ago, the abbot and prior of Woburn, the vicar of Puddington, and "other contumacious persons," were hanged by order of Henry VIII. Dodds, in his *Church History of England*, states that Roger Hobbs, the abbot of Woburn at that time, "nobly disdaining to compromise his conscience for a pension, as most of his brethren did, and as many others who do not wear a cowl do at the present day, resolutely denied the king's supremacy, and refused to surrender his sarcedotal rights. For this contumacious conduct, he was, in 1537, together with the vicar of Puddington, in this county [Bedfordshire], and others who opposed the requisition, hanged on an oak tree in front of the monastery, which is standing in the present day [1742]. He was drawn to the place of execution on a sledge, as is the custom with state prisoners." We saw this tree in September, 1836, and found it in perfect health, though with few arms that would be considered large enough for the purpose to which the tree was once applied. On a board nailed to the tree are painted the following lines, written by J. W. Wiffin, Esq.: —

> "Oh! 't was a ruthless deed! enough to pale
> Freedom's bright fires, that doom'd to shameful death
> Those who maintain'd their faith with latest breath,
> And scorn'd before the despot's frown to quail.
> Yet 't was a glorious hour, when from the goal
> Of papal tyranny the mind of man
> Dared to break loose, and triumph'd in the ban
> Of thunders roaring in the distant gale!
> Yes, old memorial of the mitred monk,
> Thou liv'st to flourish in a brighter day,
> And seem'st to smile, that pure and potent vows
> Are breathed where superstition reign'd: thy trunk
> Its glad green garland wears, though in decay,
> And years hang heavy on thy time-stain'd boughs."

The Leaden Oak, in Ampthill Park, so called from a large piece of lead having been fixed on it many years ago, is remarkable for having been one of the oaks marked in a survey made of the park in the time of Cromwell, as being then too old for naval timber. It is 67 ft. high; its trunk is 30 ft. 6 in. in

circumference; and the diameter of its head is 85 ft. The species is *Q. sessiliflòra*.

Berkshire. Chaucer is said to have planted three trees, that formerly grew in Donnington Park, near Newbury. The largest, or King's Oak, had an erect trunk, 50 ft. in height before any bough or knot appeared, a very unusual circumstance in the oak; and, when felled, cut 5 ft. square at the but end, all clear timber. The second, or Queen's Oak, gave a beam 40 ft. long, of excellent timber, perfectly straight in growth and grain, without spot or blemish, 4 ft. in diameter at the stub, and nearly 3 ft. at the top; "besides a fork of almost 10 ft. clear timber above the shaft, which was crowned with a shady tuft of boughs, amongst which were some branches on each side curved like rams' horns, as if they had been industriously bent by hand. This oak was of a kind so excellent, cutting a grain clear as any clap-board, as appeared in the wainscot that was made thereof, that it is a thousand pities some seminary of the acorns had not been propagated to preserve the species." (*Evelyn's Sylva*, book iii.) Chaucer's oak, according to Evelyn, was somewhat inferior to its companion; "yet was it a very goodly tree." It has been confidently asserted, that the planter of these oaks, or, at least, one of them, was Chaucer; but Professor Burnet thinks "their size renders it more probable that they owned a much earlier date; and that, as then fine trees, they were the favourite resort of the pilgrim bard." This opinion is corroborated by the legend told by the country people, that Chaucer wrote several of his poems under the oak that bears his name; and the fact, that Chaucer actually spent several of the latter years of his life at Donnington.

In Windsor Forest, there are several celebrated oaks: one of these, the King Oak, is said to have been a favourite tree of William the Conqueror, who made this a royal forest, and enacted laws for its preservation. This oak, which stands near the enclosure of Cranbourn, is 26 ft. in circumference at 3 ft. from the ground. It is supposed to be the largest and oldest oak in Windsor Forest, being above 1000 years old. It is quite hollow: the space within is from 7 ft. to 8 ft. in diameter, and the entrance is about 4½ ft. high, and 2 ft. wide. "We lunched in it," says Professor Burnet, "September 2. 1829: it would accommodate at least 20 persons with standing room; and 10 or 12 might sit down comfortably to dinner. I think, at Willis's and in Guildhall, I have danced a quadrille in a smaller space." (*Amœn. Quer.*, fol. x.; and *Eidodendron*, pl. 29.) Queen Anne's Oak, says Professor Burnet, "is a tree of uncommon height and beauty, under which tradition says that Queen Anne, who often hunted in Windsor Forest, generally came to mount her horse." The tree is marked by a brass plate; and there is an engraving of it in Burgess's *Eidodendron*, pl. 25. "Pope's Oak, in Binfield Wood, Windsor Forest, has the words 'Here Pope sang' inscribed upon it. Queen Charlotte's Oak is a very beautiful pollard, of prodigious size, which stands in Windsor Forest, in an elevated situation, commanding a fine view of the country round Maidenhead. It was a favourite tree of Queen Charlotte's; and George IV. had a brass plate with her name fixed on it." (*Amœn. Quer.*, fol. x.; and *Eid.*, pl. 26.) Herne's Oak, in Windsor Park, has been immortalised by Shakspeare; and the remains of its trunk were lately 24 ft. in circumference. Herne was a keeper in the forest some time before the reign of Elizabeth, who hanged himself on this oak, from the dread of being disgraced for some offence which he had committed; and his ghost was believed to haunt the spot. The following account of this tree is given in that very entertaining work, *Jesse's Gleanings*: "The next interesting tree, however, at Windsor, for there can be little doubt of its identity, is the celebrated Herne's Oak. There is, indeed, a story prevalent in the neighbourhood respecting its destruction. It was stated to have been felled by command of his late majesty, George III., about fifty years ago (1784), under peculiar circumstances. The whole story, the details of which it is unnecessary to enter upon, appeared so improbable, that I have taken some pains to ascertain the inaccuracy of it, and have now every reason to believe that it is perfectly unfounded. Herne's Oak is probably still stand-

ing; at least there is a tree which some old inhabitants of Windsor consider as such, and which their fathers did before them — the best proof, perhaps, of its identity. In following the footpath which leads from the Windsor road to Queen Adelaide's Lodge, in the Little Park, about half way on the right, a dead tree (of which *fig.* 1588. is a portrait) may be seen close to an avenue of elms. This is what is pointed out as Herne's Oak; I can almost fancy it the very picture of death. Not a leaf, not a particle of vitality appears about it. The hunter must have blasted it. It stretches out its bare and sapless branches, like the skeleton arms of some enormous giant, and is almost fearful in its decay. None of the delightful associations connected with it have however vanished, nor is it difficult to fancy it as the scene of Falstaff's distress, and the pranks of the 'Merry Wives.' Among many appropriate passages which it brought to my recollection was the following: —



1588

> —— 'There want not many that do fear
> In deep of night to walk by this Herne's Oak,'

Its spectral branches might indeed deter many from coming near it, ''twixt twelve and one.'

"The footpath which leads across the park is stated to have passed in former times close to Herne's Oak. The path is now at a little distance from it, and was probably altered in order to protect the tree from injury. I was glad to find 'a pit hard by,' where 'Nan and her troop of fairies, and the Welch devil Evans,' might all have 'couch'd,' without being perceived by the 'fat Windsor stag' when he spake like 'Herne the hunter.' The pit above alluded to has recently had a few thorns planted in it, and the circumstance of its being near the oak, with the diversion of the footpath, seems to prove the identity of the tree, in addition to the traditions respecting it:—

> 'There is an old tale goes, that Herne the hunter,
> Sometime a keeper here in Windsor Forest,
> Doth all the winter time, at still midnight,
> Walk round about an oak, with great ragg'd horns,
> And there he blasts the tree.'

The last acorn, I believe, which was found on Herne's Oak was given to the late Sir David Dundas of Richmond, and was planted by him on his estate in Wales, where it now flourishes, and has a suitable inscription near it. I have reason to think that Sir David Dundas never entertained a doubt of the tree I have referred to being Herne's Oak, and he had the best opportunities of ascertaining it. In digging holes near the tree lately, for the purpose of fixing the present fence round it, several old coins were found, as if they had been deposited there as future memorials of the interest this tree had excited." (*Jesse's Glean. in Nat. Hist.*, 2d s., p. 117.) By others another tree was said to be Herne's Oak, of which *fig.* 1589. is a portrait taken from nature some years ago. This tree, which no longer exists, had been in a decaying state for more than half a century before our drawing was made.



1589

Buckinghamshire. The large oak at Wootton (*fig.* 1590.) is, probably, one of the handsomest in England. Its trunk measures 25 ft. in circumference at 1 ft. from the ground; and at the height of 12 ft. it divides into four large limbs, the principal of which is 15 ft. in circumference. It is above 90 ft. high, and covers an area of 150 ft. in diameter with its branches. The great beauty of this tree is the breadth of its head, occasioned by the enormous size of its limbs; which gives it so completely the character of the oak, that


1590

not even the most superficial observer could ever for a moment mistake it for any other tree. The Chandos Oak (see *fig*. 1601., in p. 1763.), though it has nearly as large a head, has more the character of a spreading beech tree; and the Tibberton Oak (see *fig*. 1587. in p. 1745.), though higher, is more like an English elm. The Wootton Oak has all the attributes of beauty, dignity, and majesty, usually given to the oak tree; it once formed part of the ancient forest of Bern Wood, which was a favourite hunting ground of Edward the Confessor. " This forest was at that time infested by a wild boar, which was at last slain by a huntsman named Nigel, whom the king rewarded for this service by the grant of some lands, to be held by a horn; a mode of livery common in those days." (*Lauder's Gilpin*, vol. ii. p. 69.) This horn is still in the possession of the Aubrey family, to whom it has descended by the female line from that of Nigel. " The Chenies Oak," Professor Burnet (*Eidodendron*, pl. 2.) tells us, " is an old tree, which was going to decay in the reign of Queen Elizabeth; but, a farm-yard being established in its vicinity, it has revived, from the manure having sunk down to its roots, and has now several healthy and flourishing branches. Tradition traces it beyond the Norman Conquest." (*Amœn. Quer.*, fol. 2.)

Cheshire. The *St. James's Chronicle*, No. 5038., states that an oak was felled, a few days before, at Morley in Cheshire, which produced upwards of 1000 ft. of measurable timber. It girted 42 ft., and one branch contained 200 ft. of solid timber. Its existence could be traced back for 800 years; and it was supposed to be one of the largest trees in England. As a proof of this, it may be added, that the hollow trunk had, for some years before it was cut down, been used for housing cattle. It is said that Edward the Black Prince once dined beneath its shade. (*Mart. Mill.*, art. Quércus.) The Forest of Delamere, in this county, contains many fine oaks. In this forest " Edelfleda, a Mercian princess, founded a little town for her retirement, which obtained the title of the Happy City. The site is still known by the name of the Chamber of the Forest." (*Gilpin*.) The Combermere Oaks, at Combermere Abbey, near Nantwich, are very fine old trees. One of these (Q. pedunculàta) is 71 ft. high, and the trunk girts 37 ft. at 3 ft. from the ground; and another (Q. sessiliflòra) is 65 ft. high, and has a trunk 28 ft. in circumference at 3 ft. from the ground. The latter is quite hollow; and the inside, which is fitted up as a room, will hold twelve people. Both these trees were described as old trees when the abbey and demesne were granted to an ancestor of the present Lord Combermere, Sir G. Cotton, who was steward of the household to Henry VIII., in 1633. There is another old tree on an island in the lake, which is still in a growing state, and which is 80 ft. high, girting 24 ft.; and the diameter of the head is 75 ft.

Devonshire. The Forest of Dartmoor was formerly of great extent; and in it, at Crockern Tor, was the seat of the Parliament of the Stannerics. The forest has now nearly disappeared, but the moor still extends about 20 miles by 11 miles, and wolves were found on it as late as the reign of Queen Elizabeth. The appearance of Dartmoor is rendered very picturesque, from the abrupt eminences, crowned with huge piles of stones, and called Tors, which

are found in different parts of it. Crockern Tor, which we have mentioned above, is one of the most remarkable of them, and is thus described by Carrington:—

> ——— " Not always thus
> Have hover'd, Crockern, o'er thy leafless scalp
> The silence and the solitude which now
> Oppresses the crush'd spirits; for I stand
> Where once the fathers of the forest held
> (An iron race) the parliament that gave
> The forest law. Ye legislators, nursed
> In laps of modern luxury, revere
> The venerable spot, where simply clad,
> And breathing mountain breezes, sternly sate
> The hardy mountain council."

Near this spot, tradition says, were anciently some old oaks, under which the Britons held their courts of judicature previously to the invasion of the Romans; and under which the conference between the Saxons and the Britons took place, after which the latter gave up the kingdom, and retired into Wales. The oak trees, though the place is still called Wistman's, or Welchman's, Wood, have long since been cut down, though there are still some huge gnarled stumps amidst loose rocks of granite; and on their decayed tops, thorns, brambles, &c., are shooting forth, forming altogether a most grotesque appearance. (See *Mart. Mill.*, art. Woods.) These distorted and stunted remains, we are informed by Mr. Borrer, are all Q. pedunculàta; and some idea may be formed of their appearance from the engraving given of them by Burt, in his notes to the second edition of *Carrington's Dartmoor*. The trees in this wood are now none of them above 7 ft. high, though their trunks are more than 10 ft. in circumference. For the following account of this remarkable wood we are indebted to W. Borrer, Esq.:—" Wistman's Wood is still in existence. It is something more than a mile north of Two-Bridges, near the centre of Dartmoor, where it forms a narrow stripe, a quarter of a mile at least in length, along the western slope of a hill, at the foot of which runs a mountain brook, one of the branches of the West Dart. On the ridge of the hill are the Little Bee and the two Longaford Tors (the Great Longaford being a building-place of the raven); and the Crockern Tor, interesting to antiquaries, is on a lower part a little to the south-east. A few of the trees are scattered; but by far the greater part are packed, as it were, among the low blocks of granite that lie in abundance on the hill side; the gnarled and twisted stems reclining in the spaces between the rocks, and formed into an undistinguishable mass with them by a thick mat of mosses and lichens, of which the Anómodon curtipéndulum, bearing its very rare capsules in profusion, contributes a large proportion. I did not observe stems of any large size, but they display incontestable marks of great antiquity. The branches rise a very few feet above the rocks, and their twigs are very short, yet I found on them a tolerably vigorous crop of leaves and acorns." (*W. B.*) Meavy's Oak (*fig.* 1591.) is also on Dartmoor. Our engraving is taken from a drawing (kindly lent to us by W. Borrer, Esq.) which was made in 1833. The tree (which is stag-headed) is about 50 ft. high; the trunk, which is 27 ft. in circumference, is hollow, and it has held nine persons at one time. This oak is supposed to have existed in the time of King John. The Flitton Oak (*fig.* 1592.) stands singly on a spot where three roads meet, on an estate belonging to the Earl of Morley, in the parish of North Molton. It is supposed to be 1000 years old; and, within the memory of man, it was nearly twice its present height, which is now about 45 ft. It is 33 ft. in circumference at about 1 ft. from the ground; and at about 7 ft. it divides into eight enormous limbs. The species is Q. sessiliflòra.

1591





1592

The Staple Hill Oak, in the same county, on the property of the Duke of Somerset, is of great age, and has a trunk 37 ft. 6 in. in circumference. "At Weare Gifford, there is a curious old oak, the circumference of which, at 1 ft. from the ground, is 27 ft. 9 in.; and the head of which covers a space the diameter of which is 93 ft. The height is now between 30 ft. and 40 ft.; but, as the top has been broken off by storms, this affords no criterion as to its original height. The trunk is hollow at the bottom; and the tree appears some centuries older than any other near it." (*E.*)

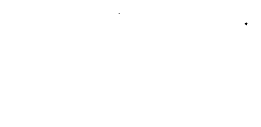
Dorsetshire. Not far from Blandford, Gilpin observes, there "stood very lately a tree known by the name of Damory's Oak. About five or six centuries ago, it was probably in a state of maturity." It measured 68 ft. in circumference at the ground, and 17 ft. above it was 16 ft. in girt. As this immense trunk decayed, it became hollow, forming a cavity 15 ft. wide, and 17 ft. high, capable of holding 20 men. During the civil wars, and till after the Restoration, this cave was inhabited by an old man, who sold ale in it. A violent storm, in 1703, greatly injured this venerable oak, and destroyed many of its noblest limbs; however, 40 years after, it was still so stately a ruin, that some of its branches were 75 ft. high, and extended 72 ft. from the bole. "In 1755, when it was fit for nothing but fire-wood, it was sold for 14*l*." (See *Hutchins's Account of Dorsetshire*, vol. i., with a print of the tree.) In this county was White Hart Forest, so called from Henry III. having here hunted a beautiful white hart, and spared its life. The forest was afterwards called Blackmoor; and Losel's Wood, mentioned by Gilbert White in his *History of Selborne*, which, he says, was on the Blackmoor estate, probably formed part of it. Most of the oaks in this grove (Losel's Wood) were of peculiar growth, and, for some purposes, of great value. They were tall and taper, like firs; but standing close together, they had very small heads, only a little brush, without any large limbs. Many of these trees were 60 ft. long, without any bough, and only 1 ft. in diameter at the smallest end. In the centre of this grove grew the Raven Oak, "which, though shapely and tall on the whole, bulged out into a large excrescence about the middle of the stem. On this oak a pair of ravens had fixed their residence for such a series of years, that it was distinguished by the title of the Raven Tree. Many were the attempts of the neighbouring youths to get at this eyry: the difficulty only whetted their inclinations; and each was ambitious of surmounting the arduous task; but, when they arrived at the swelling, it jutted out so in their way, and was so far beyond their grasp, that the most daring lads were awed, and acknowledged the undertaking to be too hazardous. So the ravens built on nest after nest in perfect security, till the fatal day arrived when the tree was to be felled. It was in the month of February, when the ravens usually sit; and the dam was upon her nest. The saw was applied to the but; wedges were inserted in the opening; the woods echoed to the heavy blows of the beetle and the mallet, and the tree nodded to its fall: yet still the dam sate on. At last, when the tree gave way, the bird was flung from her nest; and, though her maternal affection merited a better fate, she was whipped by the boughs which brought her dead to the ground." (Brown's edit. of *White's Selborne*, p. 6.)

The Great Oak at Stockbridge stands on part of the estate of Robert Gordon, Esq., of Leweston, within a few yards of the turnpike-road. This oak, though it has stood there several centuries, is in perfect health, with a well-formed head. The trunk is 22 ft. in circumference, height 52 ft., and diameter of the head 95 ft. One of the branches has been broken about 10 ft. from the bole, apparently many years ago; and the extremity, about 25 ft. or

30 ft. from the tree, now lies completely buried in the ground. The tree stands singly in a very conspicuous situation, on rising ground, and attracts the notice of travellers. At Melbury Park, there is an old oak, called Billy Wilkins, which is 50 ft. high, spreads 60 ft., and has a trunk 8 ft. high before it breaks into branches, which is 30 ft. in circumference at the smallest part, and 37 ft. at the collar. It is a remarkably gnarled knotty tree, and is called by Mitchell, in his *Dendrologia*, "as curly, surly, knotty an old monster as can be conceived;" though for marble-grained furniture, he adds, it would sell at a guinea per foot.

Essex. The Fairlop Oak stood in an open space of Hainault Forest. "The circumference of its trunk, near the ground, was 48 ft.; at 3 ft. high, it measured 36 ft. round; and the short bole divided into 11 vast branches, not in the horizontal manner usual in the oak, but rather with the rise that is more generally characteristic of the beech. These boughs, several of which were from 10 ft. to 12 ft. in girt, overspread an area 300 ft. in circuit; and for many years a fair was held beneath their shade, no booth of which was allowed to extend beyond it. This celebrated festival owed its origin to the eccentricity of Daniel Day, commonly called 'Good Day,' who, about 1720, was wont to invite his friends to dine with him, the first Friday in July, on beans and bacon, under this venerable tree. From this circumstance becoming known, the public were attracted to the spot; and about 1725 the fair above mentioned was established, and was held for many years on the 2d of July in each year. Mr. Day never failed to provide annually several sacks of beans, which he distributed, with a proportionate quantity of bacon, from the hollowed trunk of the oak, to the crowds assembled. The project of its patron tended greatly, however, to injure his favourite tree; and the orgies annually celebrated to the honour of the Fairlop Oak, yearly curtailed it of its fair proportions. Some years ago, Mr. Forsyth's composition was applied to the decayed branches of this tree, to preserve it from future injury; probably by the Hainault Archery Society, who held their meetings near it." (*Lysons.*) At this period, a board was affixed to one of the limbs of this tree, with this inscription: — "All good foresters are requested not to hurt this old tree, a plaster having been lately applied to his wounds." (See *Gent. Mag.* for 1793, p. 792.) Mr. Day had his coffin made of one of the limbs of this tree, which was torn off in a storm; and, dying in 1767, at the age of 84, he was buried in it in Barking churchyard. The persons assembled at the fair frequently mutilated the tree; and it was severely injured by some gipsies, who made its trunk their place of shelter. But the most fatal injury it received was in 1805, from a party of about sixty cricketers, who had spent the day under its shade, and who carelessly left a fire burning too near its trunk. The tree was discovered to be on fire about eight in the evening, two hours after the cricketers had left the spot; and, though a number of persons, with buckets and pails of water, endeavoured to extinguish the flames, the tree continued burning till morning. (*Gent. Mag.*, June, 1805, p. 574.) "The high winds of February, 1820," Professor Burnet informs us, "stretched this forest patriarch on the ground, after having endured the storms of perhaps 1000 winters. Its remains were purchased by a builder; and from a portion thereof the pulpit and reading-desk in the new church, St. Pancras, were constructed: they are beautiful specimens of British oak, and will long preserve the recollection of this memorable tree." (*Amœn. Quer.*, fol. 15.)

In Hatfield Broad-Oak, or Takely, Forest, near the village of Hatfield, stand the remains of an old oak, from which the village and forest derive their name of Hatfield Broad-Oak. This tree (*fig.* 1593.), in its present state, measures 42 ft. in circumference at the base; but, in 1813, before a large portion of the bark fell in, it was upwards of 60 ft. It seems to have been one of those stag-headed trees, which are remarkable for the com-



1593

parative shortness of their trunk and branches, when compared with their amazing strength and thickness. The exact age of this tree is not known; but it cannot be less than seven or eight centuries. (See *Young's Essex*, vol. ii. p. 136.)

The Hempstead Oak, near Saffron Walden, is a pollard of great age, and has a trunk from 50 ft. to 53 ft. in circumference.

Flintshire. The Shordley Oak (*fig.* 1594., from a drawing sent to us by W. Bowman, Esq.) is a magnificent ruin. It is evidently of very great age, and appears to have been at some time struck with lightning. It is quite hollow; and its bare and distorted branches have completely the air of a "blasted tree." Its circumference, at 3 ft. from the ground, is 40 ft.; and at 5 ft., 33 ft. 9 in. It is 51 ft. high.



1594

Gloucestershire. The most celebrated oak in this county was the Boddington Oak. This tree grew in a piece of rich grass land, called the Old Orchard Ground, belonging to Boddington Manor Farm, lying near the turnpike road between Cheltenham and Tewkesbury, in the Vale of Gloucester. The sides of the trunk were more upright than those of large trees generally; and at the surface of the ground it measured 54 ft. in circumference. The trunk began to throw out branches at about 12 ft. from the ground; and the total length of the tree was 45 ft. In 1783, its trunk was formed into a room, which was wainscoted. Marshall, writing in that year, states that it appeared to have been formerly furnished with large arms, but that then the largest limb extended only 24 ft. from the bole. The trunk, he adds, "is "about 12 ft. in diameter; and the greatest height of the branches, by estimation, 45 ft. The stem is quite hollow, being, near the ground, a perfect shell, and forming a capacious well-sized room, which at the floor measures, one way, more than 16 ft. in diameter. The hollowness, however, contracts upwards, and forms itself into a natural dome, so that no light is admitted except at the door, and at an aperture, or window, at the side. It is still perfectly alive and fruitful, having this year (1783) a fine crop of acorns upon it. It is observable in this (as we believe it is in most old trees), that its leaves are remarkably small; not larger, in general, than the leaves of the hawthorn." (*Pl. and Rur. Or.*, ii. p. 300.) This oak was burnt down, either by accident or design, in 1790; and in 1807 there was only a small part of its trunk remaining, which had escaped the fire. (See *Rudge's Survey of Gloucestershire*, p. 242.)

At Razies Bottom, near Ashwick, says Professor Burnet, were growing, a few years ago, three fine oaks, called the King, the Queen, and the Duke of Gloucester. The King Oak was 28 ft. 8 in. in circumference at the collar; and about 18 ft. as the average girt to the height of 30 ft., where the trunk began to throw out branches. The Queen Oak, which girted 34 ft. at the base, had a clear cylindrical stem of 30 ft. high, and 16 ft. in circumference all the way; bearing two tree-like branches, each extending 40 ft. beyond the bole, and girting at the base 8 ft.; containing in all 680 ft. of measurable timber. The Duke of Gloucester had a clear trunk, 25 ft. high, averaging 14 ft. in girt.

Hampshire. Gilpin gives the following account of some celebrated trees in the New Forest. The first of these was the tree near which William Rufus was slain, and from which, according to the legend, a druid warned him, some years previously, of his fate:—"Leland tells us, and Camden after him, that the death of Rufus happened at a place called Througham, near which a chapel was erected." The chapel has perished, and the very name of the place is not now to be found within the precincts of the New Forest. The tree has also decayed; but, about the middle of the last century, to preserve the memory of the spot, a triangular stone was erected on it by Lord Delaware, who lived in one of the neighbouring lodges; on the three sides of which were the following inscriptions:—"Here stood the oak tree on which

an arrow, shot by Sir Walter Tyrrell at a stag, glanced and struck King William II., surnamed Rufus, on the breast, of which stroke he instantly died, on the 2d of August, 1100." "King William II. being thus slain, was laid in a cart belonging to one Purkess, and drawn from hence to Winchester, and buried in the cathedral church of that city." "That the spot where an event so memorable happened might not hereafter be unknown, this stone was set up by John Lord Delaware, who has seen the tree growing in this place." (*Gilpin's Forest Scen.*, i. p. 167.) This stone was erected in 1745; and it is said that, in the reign of Charles II., the oak was paled round by that monarch's command, in order to its preservation. This tree appears to have blossomed at Christmas, like the Cadenham Oak, mentioned below.

The Cadenham Oak, about three miles from Lyndhurst, is another of the remarkable trees of the New Forest. This tree, which buds every year at Christmas, is mentioned by Camden. "Having often heard of this oak," says Gilpin, "I took a ride to see it on the 29th of December, 1781. It was pointed out to me among several other oaks, surrounded by a little forest stream, winding round a knoll on which they stood. It is a tall straight plant, of no great age, and apparently vigorous, except that its top has been injured, from which several branches issue in the form of pollard shoots. It was entirely bare of leaves, as far as I could discern, when I saw it, and undistinguishable from the other oaks in its neighbourhood; except that its bark seemed rather smoother, occasioned, I apprehended, only by frequent climbing. Having had the account of its early budding confirmed on the spot, I engaged one Michael Lawrence, who kept the White Hart, a small alehouse in the neighbourhood, to send me some of the leaves to Vicar's Hill as soon as they should appear. The man, who had not the least doubt about the matter, kept his word, and sent me several twigs on the 5th of January, 1782, a few hours after they had been gathered. The leaves were fairly expanded, and about 1 in. in length. From some of the buds two leaves had unsheathed themselves, but, in general, only one." (*For. Scen.*, i. p. 171.) One of the young trees raised from this oak at Bulstrode was not only in leaf, but had its flower buds perfectly formed, on December 21. 1781; so that this property of coming early into leaf had been communicated to its offspring. "The early spring of the Cadenham Oak," Gilpin continues, "is of very short duration. The buds, after unfolding themselves, make no further progress, but immediately shrink from the season, and die. The tree continues torpid, like other deciduous trees, during the remainder of the winter, and vegetates again in the spring, at the usual season." When "in full leaf in the middle of summer, it appeared, both in its form and foliage, exactly like other oaks." (*Ibid.*, p. 174.) Another tree, with the same property of early germination, has been found near the spot where Rufus's monument stands. This seems to authenticate Camden's account of the death of that prince; for he speaks of the premature vegetation of the tree against which Tyrrell's arrow glanced; and this may be one of its descendants. (See *Camden's Account of the New Forest.*)

The Bentley Oak, in Holt Forest, according to a letter from R. Marsham, Esq., in the *Bath Society's Papers*, was, in 1759, 34 ft. in circumference at 7 ft. from the ground, and was found, 20 years afterwards (viz. in 1778), to have increased only half an inch. Mr. Marsham accounts for taking the measure so far from the ground, by mentioning that there was an excrescence about 5 ft. or 6 ft. high, which would have rendered the measure unfair. At Beaulieu Abbey, Gilpin observes, there was, some years ago, "a very extraordinary instance of vegetation. The main stem of an oak arose in contact with a part of the wall, which was entire, and extended one of its principal limbs along the summit of it. This limb, at the distance of a few yards from the parent tree, finding a fissure in the wall, in which there might probably be some deposit of soil, shot a root through it into the earth. Thence shooting up again through another part of the wall, it formed a new stem, as large as the original tree; and from this proceeded another horizontal

branch like the former. In a great storm, on the 27th of February, 1781, both the wall and the tree were blown down together." (*Gilpin.*)

Mr. South, in the *Bath Society Papers*, tells us that in the New Forest there was an oak, which was felled in 1768, called the Langley Oak, the trunk of which, after it was cut down and barked, measured 36 ft. in circumference at the base, and 18 ft. in circumference at the height of 20 ft., which was the length of the bole. The head was all knees and crooks, and the branches extended about 40 ft. from the tree on every side. The timber was perfectly sound, and the tree was in a growing state when it was cut down.

Isle of Wight. Nunwell Park affords examples of several oaks which are supposed to have flourished, where they are now in a state of decay, at the time the grant of the park was made by William the Conqueror to the ancestor of Sir William Oglander, one of the Norman invaders, and from whose family the possession has never lapsed. (*Amœn. Quer.*, fol. 18.)



1595

Herefordshire. The Moccas Park Oak (*fig.* 1595.), on the banks of the Wye, is 36 ft. in girt at 3 ft. from the ground. It is hollow in the trunk; but its head, though much injured by time and storms, is bushy and leafy.

Hertfordshire. The Great Oak, at Panshanger (*fig.* 1596.), growing on the estate of Earl Cowper, is, as Strutt observes, a fine specimen of the oak tree in its prime. Though upwards of 250 years old, and though it has been called the Great Oak for more than a century, it yet appears "even now to have scarcely reached its meridian : the waving lightness of its feathery branches, dipping down to the very ground, the straightness of its stem, and the redundancy of its foliage, give it a character the opposite of antiquity, and fit it for the sequestered and cultivated pleasure-grounds in which it stands." (*Sylv. Brit.*, p. 7.) The huge oak near Theobald's, commonly called Goff's Oak, is 32 ft. in circumference close to the ground. It gives its name to an inn close by, from the door of which it assumes a most imposing appearance. In one of the rooms there is the figure of this oak, and stuck thereon the following printed account : — "This tree was planted A. D. 1066, by Sir Theodore Godfrey, or Goffby, who came over with William the Conqueror." (See *Amœn. Quer.*, fol. 18.)



1596

Kent. There are three fine oaks at Fredville, in the parish of Newington, in this county. The Majesty Oak (*fig.* 1597.), at 8 ft. from ground, exceeds 28 ft. in girt; and it contains above 1400 ft. of timber. Stately (*fig.* 1598.) has a clear stem 70 ft. high, and 18 ft. in girt at 4 ft. from the ground. Beauty is not so high, and is only 16 ft. in girt at 4 ft. from the ground. Fisher's Oak, about 17 miles from London, on the Tunbridge Road, is said by Martyn to have been of enormous bulk. The part of the trunk now remaining is 24 ft. in compass. When King James made a progress that way, a schoolmaster in the neighbourhood, and all his scholars, dressed in oaken garlands, came out of this tree in great numbers, and entertained the king with an oration. There is a tradition at Tunbridge Wells, that 13 men, on horseback, were once sheltered within this tree. Sir Philip Sydney's Oak, at Penshurst (*fig.* 1599.), is thus mentioned by Ben Jonson : —



1597



1598

> "That taller tree, of which the nut was set
> At his great birth, where all the Muses met."

A report existing that this tree had been cut down, we wrote to Lord De L'Isle on the subject, and are informed by His Lordship that the tree is in nearly the same state as when drawn by Strutt (from whose plate our *fig.* 1599. is a reduced copy), with the exception of the loss of a large bough. The circumference, at 3 ft. from the ground, is 30 ft. Lord De L'Isle adds that he has no doubt "that the date of the tree is anterior to the birth of Sir Philip Sydney, although it is certain that this oak (which goes by the name of the Bear's Oak, from the family bearings) is the one alluded to by Waller."



1599

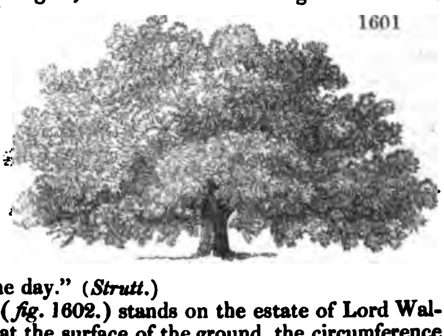
Merionethshire. The Nannau Oak, which was blown down in 1813, measured 27 ft. 6 in. in circumference, and had for centuries been celebrated among the Welsh as the Hobgoblin's Hollow Tree, "Dderwn Ceubren yr Ellyll." This celebrated tree was also known by the names of the Spirit's Blasted Tree, and the Haunted Oak. The legend respecting it is, that Howel Sele, a Welsh chieftain, and Lord of Nannau, was privately slain in a hunting quarrel by his cousin Owen Glendower, and his friend Maddoc. The body, in which life was not yet extinct, was hidden in the hollow trunk of this tree by the murderers. Owen returned in haste to his stronghold, Glendewwrdry. Howel was sought for, but in vain; and, though groans and hollow sounds were heard proceeding from the tree, no one thought of looking in it. After a lapse of years, Owen Glendower died, and on his deathbed enjoined his companion Maddoc to reveal the truth: he did so, and the skeleton of Howel was discovered upright in the hollow of the tree, and still, according to the legend, grasping a rusty sword in its bony hand. A ballad on this subject, by Mr. Warrington, is printed in the notes to Scott's *Marmion.* This celebrated oak "stood on the estate of Sir Robert Williams Vaughan, of Nannau Park, who, after its fall, had a variety of utensils manufactured from its wood, which was of a beautiful dark colour, approaching to ebony; and there is scarcely a house in Dolgelly that does not contain an engraving of this venerable tree, framed in its wood." (*Sat. Mag.*, 1832, p. 50.) *Fig.* 1600. is a reduced copy of the engraving of this tree in the *Saturday Magazine*, which is there said to have been taken from a drawing made of it by Sir Richard Colt Hoare, only a few hours before it fell.



1600

Middlesex. The Chandos Oak (*fig.* 1601.) stands in the pleasure-grounds at Michendon House, near Southgate, and is about 60 ft. high. The head covers a space the diameter of which measures about 118 ft.; the girt of the trunk, at 1 ft. from the ground, is 18 ft. 3 in. It has no large limbs; but, when in full foliage, "its boughs bending to the earth, with almost artificial regularity of form, and equidistance from each other, give it the appearance of a gigantic tent." It forms, indeed, "a magnificent living canopy, impervious to the day." (*Strutt.*)

1601



Norfolk. The Merton Oak (*fig.* 1602.) stands on the estate of Lord Walsingham. It is 66 ft. high, and, at the surface of the ground, the circumference of the trunk is 63 ft. 2 in.; at 1 ft. it is 46 ft. 1 in.; the trunk is 18 ft. 6 in. to the fork of the branches; the largest limb is 18 ft., and the second 16 ft. in circumference. The Winfarthing Oak is 70 ft. in circumference; the trunk



1602

quite hollow, and the cavity large enough to hold at least 30 persons. An arm was blown off in 1811, which contained 2 waggon loads of wood. (*Amœn. Quer.*, fol. 14.) A drawing of this tree, of which *fig.* 1603. is a copy, was sent to us by Samuel Taylor, Esq., of Whittington, near Stoke Ferry, Norfolk, accompanied by the following observations: — "Of the age of this remarkable tree I regret to be unable to give any correct data. It is said to have been called the 'Old Oak' at the time of William the Conqueror, but upon what authority I could never learn. Nevertheless, the thing is not impossible, if the speculations of certain writers on the age of trees be at all correct. Mr. South, in one of his letters to the Bath Society (vol. x.), calculates that an oak tree 47 ft. in circumference cannot be less than 1500 years old; and Mr. Marsham calculates the Bentley Oak, from its girting 34 ft., to be the same age. Now, an inscription on a brass plate affixed to the Winfarthing Oak gives us the following as its dimensions: — "This oak, in circumference, at the extremities of the roots, is 70 ft.; in the middle, 40 ft. 1820." Now, I see no reason, if the size of the rind is to be any criterion of age, why the Winfarthing should not, at least, equal the Bentley Oak; and, if so, it would be upwards of 700 years old at the Conquest; an age which might very well justify its then title of the 'Old Oak.' It is now a mere shell — a mighty ruin, bleached to a snowy white; but it is magnificent in its decay; and I do wonder much that Mr. Strutt should have omitted it in his otherwise satisfactory list of tree worthies. The only mark of vitality it exhibits is on the south side, where a narrow strip of bark sends forth the few branches shown in the drawing, which even now occasionally produce acorns. It is said to be very much altered of late; but I own I did not think so when I saw it about a month ago (May, 1836); and my acquaintance with the veteran is of more than 40 years' standing; an important portion of *my* life, but a mere span of *its own*." (*Gard. Mag.*, vol. xii. p. 586.)



1603

Northamptonshire. This county is celebrated for its forests, which are said to be sufficient in themselves to build more than twice the number of ships which now compose the British navy. There are, also, a great number of old trees in this county; probably because the inland situation of it rendered the conveyance of timber to the coast too expensive. Some of the most interesting of these trees stood in Yardley Chase, which was once a part of Salcey Forest, though it has been long disforested, and is now the property of the Marquess of Northampton. In Hayley's *Life and Posthumous Writings of William Cowper*, at the end of the third volume, there is an interesting poetic fragment, entitled "Yardley Oak," of which the following explanation is given in a letter from Dr. Johnson, a kinsman of the poet:—"Among our dear Cowper's papers, I found the following memorandum: — 'Yardley Oak, in girt, feet 22, inches 6½. The oak at Yardley Lodge, feet 28, inches 5.' As to the Yardley Oak, it stands in Yardley Chase, where the Marquess of Northampton has a fine seat [Castle Ashby]. It was a favourite walk of our dear Cowper; and he once carried me to see that oak. I believe it is five miles, at least, from Weston Lodge. It is indeed a noble tree, perfectly sound, and stands in an open part of the chase, with only one or two others near it, so as to be seen to advantage. With respect to the oak at Yardley Lodge, that is quite in decay; a pollard, and almost hollow. I took an excrescence from it in the year 1791; and, if I mistake not, Cowper told me it is said to have been an oak in the time of the Conqueror. This latter oak is in the road to the former, but not above half so far from Weston Lodge, being

only just beyond Killick and Dinglederry. This is all I can tell you about the oaks: they were old acquaintances, and great favourites, of the bard. How rejoiced I am to hear that he has immortalised one of them in blank verse! Where could these 161 lines be hid? Till this very day, I never heard of their existence, nor suspected of it." (See *Monthly Review* for July 1804, p. 249.) The noble oaks, Gog and Magog (*figs.* 1604. and 1605.), stand in the same demesne, and are also the property of the Marquess of Northampton, through whose kindness they were measured for us, in August, 1836, by Mr. Munro, His Lordship's forester. "Gog is a straight handsome tree, measuring, at 1 ft. from the ground, 33 ft. 1 in., and at 6 ft., 28 ft. 5 in., in circumference. The height is 72 ft., and the diameter of the head 83 ft. 1 in. Magog is 46 ft. 6 in. in circumference at 1 ft. from the ground, and 30 ft. 7 in. at 6 ft. It is 66 ft. 8 in. high, and the head is 78 ft. in diameter. The form of the head in both trees is irregular and much dilapidated, particularly that of Magog. Some idea may be formed of the size of the original head by the fact, that, a few years ago, one of the branches extended horizontally 57 ft. from the bole of the tree. Great part of this branch is now broken off. The trunk of Magog is much thicker, in proportion to the general size of the tree, than that of Gog, and it is not so straight: indeed, Magog 'wreathes his old fantastic roots so high,' that it is difficult to distinguish them from the trunk. Both trees are still in a growing state, and, though they have many dead branches, are yet nearly covered every year with healthy deep green foliage." At the extremity of some of the living branches, Mr. Munro found the average length of the current year's wood to be about 3½ in.; and from one of the excrescences (commonly called warts) on the trunk of Magog he took a one year's shoot 12 in. long. Both the trees are of the same species (*Q. pedunculàta*). Mr. Munro adds that he does not think that Mr. Strutt has done justice to Magog (*fig.* 1604.), which, he says, is quite as vigorous a tree, and nearly as large, as Gog (*fig.* 1605.). Cowper's Oak, or Judith, as it is sometimes called, from a legend that it was planted by Judith, the niece of William the Conqueror, "stands close by the side of the principal carriage drive round Yardley Chase, and must have been a favourite with Cowper on account of its grotesque figure, rather than from its size or beauty. Like many other old oak trees in this neighbourhood, it exhibits a huge misshapen mass of wood, swelling out, here and there, in large warty tumours. Its girt, at 1 ft. from the ground, is 30 ft., and at 6 ft., 24 ft. 1 in.; height, 31 ft.; diameter of the head, 38 ft.; length of last summer's young wood, 7 in., 8 in., and 10 in." The trunk leans so much to the south, Mr. Munro informs us, "as almost to admit of a person walking up, with very little aid from the hands, to the point where the branches diverge; or, I rather should say, to the point from which the branches did diverge, which may be about 13 ft. from the ground. Here the remains of three huge branches are seen extending in opposite directions, to the length of about 10 ft. or 12 ft. from the trunk. Not a vestige of bark is upon them, they are quite hollow, and, in some parts, half of this crust has wasted away. On the south side, the trunk has the appearance of having been cleft down the middle, from top to bottom; here is an aperture, or doorway, 9 ft. high, 2½ ft. wide at the bottom, and 3 ft. wide at the top, which admits the visitor into the interior, or chamber, an apartment extending from north to south 6 ft. 6 in., and from east to west 4 ft. in one place, and 2 ft. 6 in. in another place. The remaining crust of the tree is but a few inches thick in some places; the wood, although it has been dead probably for centuries, retains an astonishing degree of hardness, and is thickly perforated by insects. There are only ten live boughs in the head, all



1604



1605

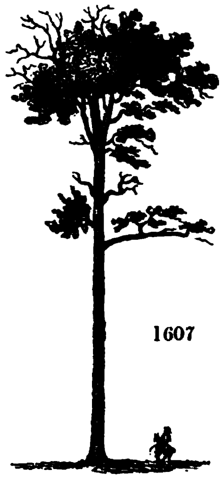
which are of small dimensions, and apparently of very recent growth; the longest, probably, would not measure 8 in. in circumference. Visitors having been in the habit of cutting out and carrying away small blocks or slices of the sounder part of the wood as relics, or to manufacture into snuffboxes; to prevent these depredations, Lord Northampton caused the following notice to be painted on a board, and nailed to the tree:—'Out of respect to the memory of the poet Cowper, the Marquess of Northampton is particularly desirous of preserving this oak:' since which, very little damage has been done." The Salcey Forest Oak (*fig.* 1606.) Sir Thomas Dick Lauder describes as "one of the most picturesque sylvan ruins that can be met with any where." It is supposed to be above 1500 years old; and its trunk is so decayed, as to form a complete arch, which is 14 ft. 8 in. high, and 29 ft. in circumference, inside. The tree is 33 ft. 3 in. high, and about 47 ft. in circumference on the outside near the ground. (*Strutt.*) This fine ruin is still standing; and, though it has latterly become much wasted, it annually produces a crop of leaves and acorns.



1606

At Pilckley, in this county, there was formerly an old oak, a large fork in which had been the resting place of a pair of ravens for several generations; and near Benefield there is a large stone set up, with an inscription on it, "Near this place stood Bocawse Oak." (*Gent. Mag.*, Dec. 1791, p. 179.)

Nottinghamshire. The most remarkable oaks in this county are those in the Duke of Portland's park at Welbeck; an excellent account of which was published by Major Hayman Rooke, in 1790. The Duke's Walkingstick (*fig.* 1607.), the first mentioned of these trees, was, in 1790, 111 ft. 6 in. high, the trunk rising to the height of 70 ft. 6 in. before it formed a head. The circumference of the trunk, at the ground, was 21 ft.; and at 3 ft. high, 14 ft. This tree, we are informed by Mr. Mearns, the duke's gardener, "was cut down soon after Major Rooke published his description of it; but there is an oak at Welbeck, called the Young Walkingstick, about 110 years old, as clean nearly, and as straight, as the mast of a ship; and as perpendicular as if grown to a plumb-line. It is about 95 ft. high; or, the woodman thinks, if nicely measured, it is quite 100 ft., and girts, at 3 ft. from the ground, 5 ft." The Two Porters are on the north side of Welbeck Park. They are called the Porters, from a gate having been formerly between them. The height of the Large Porter, in 1790, was 98 ft. 3 in.; but it is now (1837) only 75 ft. The circumference of the trunk, at the surface of the ground, is 38 ft.; and at 3 ft., 27 ft.: the extent of the branches is 93 ft. The Little Porter, in 1790, was 88 ft. high, but is now only 74 ft.; the circumference, at the ground, is 34 ft.; and at 3 ft. high, 27 ft. "At some far distant period," continues Mr. Mearns, "they have been spreading, lofty, and noble trees; and, as well as many others at Welbeck, they are still grand in decay." Another remarkable oak at Welbeck, mentioned by Major Rooke, was called the Seven Sisters, from its having anciently had seven trunks issuing from a stool. These trunks were all nearly of the same height; and the tallest, in 1790, measured 88 ft. 7 in. The Gamekeeper's Tree is quite hollow, and is remarkable for having, notwithstanding, a flourishing and vigorous head. "In this tree," says Major Rooke, "the gamekeeper secretes himself when he shoots the deer; and there are small apertures on the side opposite the entrance for his gun: on the inside is cut the date, 1711." The Greendale Oak (*fig.* 1608., from Strutt, and *fig.* 1609., from *Hunter's Evelyn*) has long been a very celebrated



1607

tree, and is probably but little altered during the last century. The difference between the two engravings of it was so great, that we wrote to the Duke of Portland to ascertain the present state of the tree; and we have been informed by His Grace, that Major Rooke's portrait still affords a correct representation of it. "In 1724, a roadway was cut through its venerable trunk, higher than the entrance to Westminster Abbey, and sufficiently capacious to permit a carriage and four horses to pass through it." (*Strutt's Sylva.*) The dimensions of this tree are thus given by Major Rooke: — "Circumference of the trunk above the arch, 35 ft. 3 in.; height of the arch, 10 ft. 3 in.; width of the arch about the middle, 6 ft. 3 in.; height to the top branch, 54 ft." Major Rooke's drawing, which is the same view of the tree as that in Hunter's *Evelyn*, which we have copied in *fig.* 1609., was made at the same time as that of the Gamekeeper's Tree, viz. in 1779. According to Hunter's *Evelyn*, about 1646 this oak was 88 ft. high, with a trunk girting 33 ft. 1 in.; the diameter of the head 81 ft. "There are three great arms broken and gone, and eight very large ones yet remaining, which are very fresh and good timber."



1608



1609

The Parliament Oak (*fig.* 1610.) grows in Clipstone Park, and derives its name from a parliament having been held under it, by Edward I., in 1290. The girt of this tree is 28 ft. 6 in. Clipstone Park is also the property of the Duke of Portland, and is supposed to be the oldest park in England, having been a park before the Conquest, and having been then seized by William, and made a royal demesne. Both John and Edward I. resided, and kept a court, in Clipstone Palace. In Birchland, in Sherwood Forest, there is an old oak, which measures, near the ground, 34 ft. 4 in. in circumference; and at 6 ft., 31 ft. 9 in. "The trunk, which is wonderfully distorted, plainly appears to have been much larger; and the parts from which large pieces have fallen off are distinguishable. The inside is decayed and hollowed by age; and I think," adds Major Rooke, "no one can behold this majestic ruin without pronouncing it to be of very remote antiquity; and I might venture to say that it cannot be much less than 1000 years old." (p. 14.)



1610

In Worksop Park, according to the record quoted in Hunter's *Evelyn*, there were some noble trees about 1646. One of these, when cut down, measured from 29 ft. to 30 ft. in circumference throughout the bole, which was 10 ft. long. Another tree had a head 180 ft. in diameter, and was computed to cover half an acre of ground. Other trees, 40 ft. in the bole, gave 2 ft. square of timber at the upper end. The Lord's Oak girted 38 ft. 4 in. The Shire Oak, which is still standing, had then a head 90 ft. in diameter, which extended into three counties (York, Nottingham, and Derby), and dripped over 777 square yards.

Oxfordshire. Of the Magdalen, or Great, Oak of Oxford, Gilpin gives the following interesting notice: — "Close by the gate of the water walk of Magdalen College, Oxford, grew an oak, which, perhaps, stood there a sapling when Alfred the Great founded the university. This period only includes a space of 900 years, which is no great age for an oak. It is a difficult matter to ascertain the age of a tree. The age of a castle or abbey is the object of history: even a common house is recorded by the family who built it. All these objects arrive at maturity in their youth, if I may so speak. But the

time gradually completing its growth is not worth recording in the early part of its existence. It is then only a common tree; and afterwards, when it becomes remarkable for age, all memory of its youth is lost. This tree, however, can almost produce historical evidence for the age it boasts. About 500 years after the time of Alfred, William of Waynfleet, Dr. Stukely tells us, expressly ordered his college [Magdalen College] to be founded near the Great Oak (*Itin. Curios.*); and an oak could not, I think, be less than 500 years of age to merit that title, together with the honour of fixing the site of a college. When the magnificence of Cardinal Wolsey erected that handsome tower which is so ornamental to the whole building, this tree might probably be in the meridian of its glory; or rather, perhaps, it had attained a green old age. But it must have been manifestly in its decline at that memorable era, when the tyranny of James gave the fellows of Magdalen so noble an opportunity of withstanding bigotry and superstition. It was afterwards much injured in the reign of Charles II., when the present walks were laid out. Its roots were disturbed; and from that period it declined fast, and became reduced to a mere trunk. The oldest members of the university can hardly recollect it in better plight; but the faithful records of history have handed down its ancient dimensions. (See *Dr. Plot's History of Oxfordshire.*) Through a space of 16 yards on every side from its trunk, it once flung its boughs; and under its magnificent pavilion could have sheltered with ease 3000 men. In the summer of 1788, this magnificent ruin fell to the ground. It then appeared how precariously it had stood for many years. The grand taproot was decayed, and it had a hold of the earth only by two or three rootlets, of which none exceeded a couple of inches in diameter. From a part of its ruins a chair has been made for the president of the college, which will long continue its memory." (*For. Scen.*, i. p. 140.)

Shropshire. The Shelton Oak (*fig*. 1611.), growing near Shrewsbury, measured, in 1810, as follows: — Girt, close to the ground, 44 ft. 3 in.; 5 ft. from the ground, 25 ft. 1 in.; 8 ft. from the ground, 27 ft. 4 in.; height to the principal bough, 41 ft. 6 in. (*Gent. Mag.*, Oct. 1810.) The tree was very much decayed in 1813, and had a hollow at the bottom sufficient to hold with ease half a dozen persons. (*Beauties of England and Wales; Shropshire*, 179.) This oak was celebrated for Owen Glendower having mounted on it to observe the battle of Shrewsbury, fought on June 21. 1403, between Henry IV. and Harry Percy. The battle had commenced before Glendower arrived; and he ascended the tree to see how the day was likely to go. Finding that Hotspur was beaten, and the force of the king was overpowering, he retired with his 12,000 men to Oswestry. We have received the following account of the present state of this remarkable oak from John F. M. Dovaston, Esq., M.A., of Westfelton, near Shrewsbury: —



1611

" To the numerous descriptions and histories of this venerable and venerated tree there remains little more necessary to add, than that, of late years, it has shown but slow tendency to farther decay; and that it is now somewhat protected by having been taken within the grounds of a very chastely ornamented house, built in the ancient fancy Gothic, by Robert Burton, Esq., whose very pure taste, and extensive improvements, have made the elevated and conspicuous village of Shelton one of the most beautiful in a county eminent for the beauty of its villages. With regard to the far-famed tree itself, however, there may be some who will think it has lost much of its grotesque and commanding wildness, now surrounded with shrubberies, dressed grass-plots, and gravel walks; since it towered with rude but majestic grandeur over groups of gipsies, cattle, or casual figures, amid the furze, bushes, and wild-flowers of a rough uncultured heath." It has lately received a poetical inscription from the pen of Mr. Dovaston.

Staffordshire. The Royal Oak of Boscobel, in which Charles II. took refuge after the battle of Worcester, was prematurely destroyed by an ill-judged

passion for relics; "and a huge bulk of timber, consisting of many loads, was taken away in handfuls. Several saplings were raised, in different parts of the country, from its acorns, one of which grew near St. James's Palace, where Marlborough House now stands; and there was another in the Botanic Garden, Chelsea. The former has been long since felled; and of the latter even the recollection seems now almost lost." (*Mart. Mill.*)

The Swilcar Lawn Oak (*fig.* 1612.), in Needwood Forest, measures 34 ft. in circumference near the ground, though it is supposed to be 1000 years old, and is known by historical documents to have been a large tree more than 600 years: it is still in a growing state. Strutt states that, about 1830, it measured, at 6 ft. from the ground, 21 ft. 4½ in. in circumference; and that 54 years before, when measured at the same height from the ground, it girted only 19 ft. This oak is celebrated in Mundy's poem of *Needwood Forest*, and by Dr. Darwin.



1612

In Bagot's Park, near Blithefield, about four miles from Lichfield, there are several very remarkable trees. Bagot's Park is the seat of Lord Bagot, who may be regarded as one of the greatest planters of oaks "in the kingdom; having planted two millions of acorns on his estates in Staffordshire and Wales." (*Strutt.*) The Squitch Oak (*fig.* 1613.) has a clear trunk 33 ft. high, which contains 660 cubic ft.; one limb, 44 ft. long; and 14 other limbs containing altogether 352 cubic feet; making a total of 1012 cubic feet of timber. The total height is 61 ft.; the circumference, near the ground, is 43 ft.; and at 5 ft., is 21 ft. 9 in. The Rake's Wood Oak is a very old tree, and has lost many of its branches, and several feet of its height. It is now about 55 ft. high, and pretty nearly 30 ft. in circumference at 5 ft. from the ground. The Long Coppice Oak is rather smaller than the last: it is very old and unsound, and has lost many heavy branches, and many feet of its height. Bett's Pool Oak is a bull oak; that is, it is hollow, and open on one side. The hollow is 9 ft. in diameter; but the trunk is only about 8 ft. high. The Lodge Yard Oak is an old hollow tree, capable of holding a dozen people, 33 ft. 6 in. in circumference at 3 ft. from the ground. The Beggar's Oak (*fig.* 1614.) is also in Bagot's Park, and has a trunk 27 ft. 3 in. in circumference at 5 ft. from the ground: the height is about 60 ft. "The roots rise above the ground in a very extraordinary manner, so as to furnish a natural seat for the beggars chancing to pass along the pathway near it; and the circumference taken around these is 68 ft. The branches extend about 50 ft. from the trunk in every direction. This tree contains 877 cubic feet of timber; which, including the bark, would have produced, according to the price offered for it in 1812, 202*l.* 14*s.* 9*d.*" (*Lauder's Gilpin*, i. p. 254.) We have been favoured with the dimensions of the above trees by Messrs. Thomas and George Turner, through the kindness of Lord Bagot. In Beaudesert Park there is a very large oak, the trunk of which is now a mere shell, sufficiently roomy to allow eight people to stand within it. The late Lady Uxbridge often sat within this tree; and there is a circular hole in the bark, through which she used to place a telescope, in order to amuse herself bv looking at objects in the sur-



1613

1614



rounding country. Near Newee gate, in the same park, stands the Roan Oak, the branches of which are almost all partially decayed, and distorted and twisted into the most fantastic forms. One of these resembles a writhing serpent, and another forms no bad representation of a lion cowering, and just ready to spring on his prey. The trunk of this tree is 26 ft. 3 in. in circumference. The Magii Oak, which is supposed by the country people to be haunted by evil spirits, has a hollow open trunk, and is nearly 30 ft. in circumference. Another, situated in a ravine, called the Gutter Oak, is also hollow, and has a trunk nearly 40 ft. in circumference. (See *Gard. Mag.*, vol. xii. p. 312.)

Suffolk. The Huntingfield Oak. The following account of Queen Elizabeth's Oak (*fig.* 1615.) is copied from *A Topographical and Historical Description of Suffolk*, published in 1829 : — " *Huntingfield.* An oak in the park, which Queen Elizabeth was particularly pleased with, afterwards bore the appellation of the Queen's Oak. It stood about two bow-shots from the old romantic hall; and, at the height of nearly 7 ft. from the ground, measured more than 11 yards in circumference; and this venerable monarch of the forest, according to all appearance, could not be less than 500 or 600 years old. Queen Elizabeth, it is said, from this favourite tree shot a buck with her own hand. According to the representation of its appearance in Davy's *Letters*, the principal arm, 'now dry with bald antiquity,' shot up to a great height above the leafage; and, being hollow and truncated at the top, with several cracks resembling loopholes, through which the light shone into its cavity, it gave an idea of the winding staircase in a lofty Gothic tower, which, detached from the ruins of some venerable pile, hung tottering to its fall." Mr. Turner, curator of the Botanic Garden, Bury St. Edmund's, who sent us the above extract, has also obtained for us the following statement of the present appearance of this venerable tree from his friend Mr. D. Barker, florist, Heveningham Hall : — " It is decidedly *Q.* pedunculàta ; and, according to a historical account in my possession, it is now between 1000 and 1100 years old. At this time (November, 1836), some parts of the tree are in great vigour, having healthy arms 10 ft. in circumference, and one even larger. The boughs cover a space of 78 yards ; but the trunk has long since gone to decay, it being now quite hollow in the interior. The circumference of the trunk is 42 ft. at 5 ft. from the ground ; and the height 75 ft." The great hall of the mansion, within " two bow-shots " of which this oak grew, according to Davy's *Letters*, was remarkable for being " built round six straight massy oaks, which originally supported the roof as they grew. Upon these the foresters and yeomen of the guard used to hang their nets, crossbows, hunting-poles, great saddles, calivers, bills, &c. The roots had been long decayed," continues Davy, writing in 1772, " when I visited this romantic dwelling; and the shafts, sawn off at the bottom, were supported either by irregular logs of wood, or by masonry." (*Letters*, &c., i. p. 240.) No trace of this old hall is now remaining, the ruins having been taken down about the end of the last century.

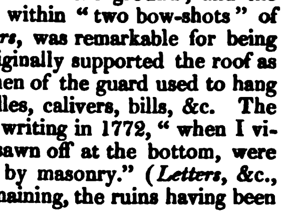


1615

Surrey. The Grindstone Oak, near Farnham, was once an enormous tree. Its circumference, near the ground, is still 48 ft.; and at 3 ft. high, 33 ft. It is, however, fast waning to decay. (*Amœn. Quer.*)

Sussex. The venerable oak at Northiam, famed for its size, and for having given shelter to Queen Elizabeth, who once breakfasted under its extensive branches, on her way through the village to London, was partially blown down in a storm in 1816. (*Gent. Mag., Suppl.*, 1816, p. 619.)

Warwickshire. The Bull Oak, in Wedgenock Park (*fig.* 1616.), is a remarkable specimen of an oak of this kind. It measures at 1 ft. above the ground 40 ft., and 6 ft. from the



1616

ground 37 ft., in circumference. The height of the trunk is about 17 ft before it throws out branches. The inside is quite decayed; and, being open on one side, cattle are generally found sheltering in it. The head is still in a vigorous and flourishing state. The Gospel Oak (*fig.* 1617.) stands near Stoneleigh Abbey; and it derives its name from the custom which formerly prevailed, when the minister and other officers of the parish went round its boundaries in Rogation Week, of stopping at remarkable spots and trees, to recite passages of the Gospel.



1617

Westmoreland. The Earl of Thanet's Hollow Oak, in Whinfield Park, measured, in 1765, 31 ft. 9 in. in circumference. (*Bath Soc. Papers*, vol. i. p. 66.)

Wiltshire. In Savernake Forest there are many large and noble oaks. The King Oak (*fig.* 1619.) has a trunk which is 24 ft. in circumference, and is hollow: this tree is very picturesque. The Creeping Oak, in the same forest (*fig.* 1618.), is also a very remarkable tree.



1618



1619

Yorkshire. The Cowthorpe Oak (*fig.* 1620.) is a very remarkable tree. The following are the dimensions of this tree, as given in Hunter's *Evelyn*:—Close to the ground, it measured 78 ft. in circumference; and at 3 ft. from the ground, 48 ft. The following account was sent to us by a correspondent in Yorkshire, in October, 1829:—"Cowthorpe is a small village on the right bank of the river Nidd, in the wapentake of Clare, in the West Riding of the county of York, and about a mile and a half on the right of the great road from London to Edinburgh, where it crosses the river by Walshford Bridge. This stupendous oak stands in a paddock near the village church, and is the property of the Hon. E. Petre of Stapleton Park, near Ferrybridge. On a stranger's first observing the tree, he is struck with the majestic appearance of its ruined and riven-looking dead branches, which in all directions appear above the luxuriant foliage of the lateral and lower arms of the tree. In 1722, one of the side branches was blown down in a violent gale of wind; and, on being accurately measured, was found to contain upwards of five tons of wood. The largest of the living branches at present extends about 48 ft. from the trunk; and its circumference, at about one yard from the giant bole, is 8 ft. 6 in.. Three of the living branches are propped by substantial poles, resting upon stone pedestals. The diameter in the hollow part, at the bottom, is 9 ft. 10 in.: the greatest height of the dead branches is about 56 ft. It is evidently of very great antiquity, as all tradition represents it as a very old tree."

1620



The Wellbred Oak, on Kingston Hill, near Pontefract, is supposed to be 800 years old. Its height is 70 ft., and its trunk 33 ft. in circumference: it is *Q.* pedunculàta. The trunk is quite hollow, and open on one side; and the asses and other cattle grazing on the common often shelter in it.

Scotland. — *Dumfriesshire.* An oak at Lochwood, in Annandale, is mentioned by Dr. Walker, in his *Essays*, &c., as measuring, in 1773, 60 ft. in height; with a trunk 14 ft. in circumference, at 6 ft. from the ground; and a fine, spreading, circular head, about 60 ft. in diameter. Through the kindness of Hope John-

stone, Esq., we are enabled to give the dimensions of this tree, as taken in November, 1836. Height, 49 ft.; circumference of the trunk, 16 ft.; diameter of the head, 68 ft. "This tree stands in a wood of oaks, in which the Castle of Lochwood (the original residence of the Johnstone family) is situated. It is quite vigorous; but most of the other trees are in a state of decay. There are the remains of larger oaks, the diameter of the trunk of one of which is 6 ft.; but little of its head remains." An oak at Barjarg, in Nithsdale, in 1796, measured 17 ft. in circumference. In the year 1762, Lord Barjarg was informed by some very old people, that, about 90 years previous to that date, the tree had been bored, with a view to ascertain if it were sound, which it was; and from the margin of the hole bored some branches proceeded, one of which was then (1762) a considerable bough. (*Walker's Essays*, p. 6.) The Blind Oak of Keir, on the estate of W. H. Hunter, Esq., is mentioned in the title deeds of the estate, about 200 years ago. In 1810, it measured 17 ft. 2 in. in circumference, at 4 ft. 6 in. from the ground.

Inverness-shire. In a very old oak wood on the north of Loch Arkeg, in Lochaber, Dr. Walker mentions a tree which measured 24 ft. 6 in. in circumference at 4 ft. from the ground. In the same county, Sir Thomas Dick Lauder found the remains of a "magnificent oak forest, not, as is commonly the case, embedded in peat earth, but lying on the surface of the solid ground, as trees would do that had been newly thrown down. Many years must have elapsed since these trees were laid prostrate; for there is now a very old and beautiful birch wood growing on the ground they formerly occupied. We measured one of these trunks, and found it to be 23 ft. long, without a branch; 16 ft. round the but end; and 11 ft. in circumference towards the smaller end, under the fork. With the exception of an inch or two of the external part, which was weather-wasted, it appeared perfectly fresh. It lay within a yard of the root on which it grew; but it was not easy to determine, from appearances, how it was severed from it. The stump remaining in the ground was worn away in the centre, and hollowed out; so that it now encircles a large birch tree of more than 1 ft. in diameter, self-sown, and growing vigorously, within the ancient shell of the oak." (*Lauder's Gilpin*, i. p. 253.)

Renfrewshire. The Wallace Oak. (*fig.* 1621.) At Ellerslie, the native village of the hero Wallace, there is still standing "the large oak tree," among whose branches it is said that he and 300 of his men hid themselves from the English. Its circumference at the base is 21 ft.; and at 15 ft., 13 ft. 2 in.: its height is 67 ft.; and the expanse of its boughs is, E. 45 ft., W. 36 ft., S. 30 ft., N. 25 ft.; thus spreading over an extent of 19 English, or 15 Scotch, poles. This oak, we are informed by Alexander Spiers, Esq., the proprietor of Ellerslie, is still in the same state as when Strutt's drawing was made, of which ours is a reduced copy. According to another legend, Wallace hid himself among the boughs of this oak when his enemies were sacking his house at Ellerslie. (See *Miss Porter's Scottish Chiefs*, &c.)

1621



Roxburghshire. Near Jedburgh, on the estate of the Marquess of Lothian, stands a remarkable oak, called the King of the Woods. "It is now (January 19. 1837) 16 ft. 6 in. in circumference, at 1 ft. from the ground; its whole height is 73 ft.; the height of the trunk, before it forms branches, is 43 ft.; and it is as straight as, and something of the form of, a wax candle. It is, perhaps, the finest piece of oak timber in Scotland; and its beauty has probably saved it from the axe, for it, and its neighbour, the Capon Tree, seem to be a century older than any of the other old trees in the county. The Capon Tree is also an oak; but it possesses quite a different character from that of the King of the Woods; the trunk, and every branch of it, being excessively crooked. At one time, it must have covered an immense space of ground; but, from being long

neglected and ill pruned, the size has been for many years diminishing, though the marquess is now having every possible care taken to keep the tree alive. The circumference of this tree, at 2 ft. from the ground (for it is all root under that height), is 24 ft. 6 in.; and the whole height is 56 ft.: the space the branches overhang is above 92 ft. in diameter. This last tree is said to have been the place where the border clans met in olden times; and hence the name of Capon, from the Scotch word kep, to meet. It stands in a haugh (meadow) close by the side of Jedwater; and the King of the Woods on the top of a bank, about 300 or 400 yards south of it, and both near the old Castle of Ferniherst, and about a mile and a half above the burgh of Jedburgh." We are indebted for the above account to Mr. Grainger of Harestanes, through the kindness of the Marquess of Lothian, to whom he is agent.

Stirlingshire. Wallace's Oak, in Tor Wood, the dimensions of which are given by Dr. Walker, is said by some to have been the tree under the branches of which Wallace and 300 of his men concealed themselves, instead of the oak at Ellerslie; while others assert that Wallace concealed himself, after a lost battle, among its boughs. Even in 1771, when Dr. Walker saw it, this tree was in a state of great decay. It had separated in the middle, and one half had mouldered entirely away. "The other half," continues Dr. Walker, "remains, and is in one place about 20 ft. high." The whole of this remnant, Dr. Walker adds, was red wood, from the heart to the very bark, and was "so hard, even in its putrid state, as to admit of a polish. In this ancient Tor Wood it stands, in a manner, alone." Compared to it, even the oldest tree near it "is but of very modern date. The memory of its having saved Wallace has, probably, been the means of its preservation, when all the rest of the wood, at different times, has been destroyed." Dr. Walker concludes by stating his opinion, from the remains that existed in 1771, that the Wallace Oak had once been about 22 ft. in circumference at 4 ft. from the ground. "Its trunk has never been tall; for at about 10 ft. from the ground it has divided into several large arms. The tree stands in coarse land, in a deep wet clay soil." (*Essays*, &c., p. 9.)

Ireland. There are no very old trees in this country, though there are some very large ones in a state of vigorous growth, as will be seen by our *Statistics*. On the subject of the old or celebrated trees of Ireland, we have received the following communication: — "Generally speaking, no timber is suffered to attain any tolerable age now in Ireland; which is much to be regretted, as, judging from the remains found in great abundance in the bogs, which now occupy the place of the ancient forests, the oak and Scotch pine formerly grew to an enormous size here. I have been assured, by a person of credit, that he has repeatedly found them 8 ft. in diameter, and hopes soon to obtain a specimen of that size."



1622

Celebrated Oaks in France. The Chapel Oak of Allonville (*fig.* 1622.) measures, just above the roots, 35 ft. in circumference; and at 5 ft. or 6 ft., 26 ft. A little higher up, it extends to a greater size; and at 8 ft. it throws out enormous branches, which cover a great extent of ground with their shade. The trunk is low, and quite hollow; but the branches produce abundance of leaves and acorns. The lower part of the trunk has been, many years since, transformed into a chapel, carefully paved and wainscoted, and closed with an iron gate. Above is a small chamber, containing a bed; and leading to it there is a staircase which turns round the body of the tree. At certain seasons of the year, divine service is performed in this chapel. The summit of the tree has been broken off many years; and over the cavity is a pointed roof, covered with slates, in the form of a steeple, which is surmounted by an iron cross. The cracks which occur in various parts of the tree are also covered with slates. Over the entrance to the chapel there is an inscription, stating that it was formed by the Abbé du Détroit, curate of Allonville, in the

year 1696; and over the door of the upper room is a label, dedicating it to "Our Lady of Peace." Allonville is about a mile from Yvetot, on the road between Rouen and Havre.

The following information we have received from our friend, the Abbé Gosier of Rouen. In the first volume of the *Archives annuelles de la Normandie*, printed at Caen in 1824, there is an article on the oaks of Fournet, in which, after mentioning that several of these oaks were of enormous size, the following particulars are given of some of them:—The Goulande Oak near Dourfront is about 30 ft. in circumference. The two oaks of Mayior, in the canton of Calvados, are of very great size. The largest is above 42 ft. in circumference at the surface of the ground, and above 30 ft. in circumference at the height of 6 ft. All these oaks have lost their leading shoots, and have their trunks hollow. The oak called *La Cave* is a very remarkable tree. It stands in the Forest of Brothone. The trunk is 26 ft. in circumference in its smallest part; it is hollow; and at a few feet from the base it divides into five large branches or rather trees, which rise to a considerable height. The trunk from which they spring has the appearance of a large goblet; it is hollow, cup-shaped, covered with bark inside, and nearly always filled with water, which is seldom less than 5 ft. deep. "I visited this tree," says M. Deshayes (who wrote the account which has been sent to us by the Abbé Gosier), "on July 30th, 1825, and, though it was a season of extraordinary drought, I found the water in the tree was 2 ft. 6 in. deep. I visited it some months afterwards, and found the basin full." At Bonnevaux is an oak, in the hollow trunk of which there is a circular table, round which 20 persons have sate to dinner. (*Letter from l'Abbé Gosier.*)

A large oak in the Forest of Cerisy, known under the name of the Quênesse, at a little distance to the right of the great road to St. Lo, is supposed, by comparing various data, to be 800 or 900 years old. In 1824, it measured 36 ft. in circumference just above the soil, and was about 55 ft. high. The trunk is now hollow, and will hold 14 or 15 persons. (*Athenæum*, Aug. 20. 1836.)

An immense oak was, in May, 1836, felled on the road from Vitre to Fougères. It was 22 ft. in circumference, had a straight trunk 30 ft. long, and weighed 24 tons. Ten pair of oxen and twenty horses were required to carry it away. (*Galignani.*)

Large Oaks in Germany. The ancient Germans, history informs us, had oak castles. In the hollow of one, we read that a hermit built his cell and chapel; and of some oaks of almost incredible bulk, which Evelyn says in his time were "lately standing in Westphalia," one was 130 ft. high, and reported to be 30 ft. in diameter; another yielded 100 loads of timber; and a third "served both for a castle and a fort." (*Amœn. Quer.*) The following extract is from Googe's *Four Bookes of Husbandrie* (1586):—"We have at this day an oke in Westphalia, not far from the Castle of Alsenan, which is from the foote to the neerest bowe, one hundred and thirtie foote, and three elles in thickness; and another, in another place, that, being cutte out, made a hundred waine load. Not farre from this place there grew an other oke of tenne yardes in thicknesse, but not very hie." (p. 101. *b.*)

Having now given what may be considered a county biography of celebrated British oaks, and enumerated a few remarkable foreign ones, we shall next collect together, without reference to locality, the names of a few remarkable for some peculiarity in their trunks or branches; in their origin; the trees with which they grow; for the quantity of timber they have produced, or their rate of growth; and which, for the sake of distinction, may be called the comparative biography of celebrated oaks.

Oaks remarkable for their Age. "If we consider," says Marshall (*Plant. and Rur. Orn.*) "the quick growth of the chestnut, compared with that of the oak, and, at the same time, the inferior bulk of the trunk of the Tortworth Chestnut to that of the trunk of the Cowthorpe, the Bentley, or the Doddington Oak, may we not venture to infer that the existence of these truly venerable trees

commenced some centuries prior to the era of Christianity?" We can readily subscribe to this doctrine," says a writer in the *Magazine of Natural History*, vol. iii. p. 379., "and feel, indeed, quite at a loss to set limits, under favourable circumstances, to the natural duration of this monarch of the forest." Those oaks in England which are reputed to be the oldest are; the Parliament Oak (p. 1767.); Cowper's Oak (p. 1765.); the Winfarthing Oak (*fig.* 1623.), which



1623

is said to have been an old oak at the time of the Conquest (p. 1764.); the Nannau Oak, which was a hollow oak in the reign of Henry IV. (see p. 1763.); the Salcey Forest Oak (see p. 1766.); and the Bull Oak in Wedgenock Park, which was made a park about the time of Henry I. (see p. 1770.). To these might be added several others, perhaps of equal age, such as the Flitton Oak (see p. 1757.), but which have not attracted public attention, in that particular, so much as those above enumerated.

The largest Oaks on Record. The Rev. Abraham De la Pryme records, in the *Philosophical Transactions* for 1701, that his friend Mr. Edw. Canby found within his moors, beneath the level of Hatfield Chase, in Yorkshire, the solid trunk of an oak tree, 120 ft. long, 36 ft. in circumference at the but end, 30 ft. in circumference at the middle, and 18 ft. at the small end, where the trunk was broken off; so that, by moderate computation, he says, this tree may have been 240 ft. in height. Dr. Plot mentions an oak at Norbury, which was of the circumference of 45 ft.; an oak at Rycote, under the shade of which 4374 men had sufficient room to stand. The Boddington Oak, in the Vale of Gloucester (see p. 1760.), was 54 ft. in circumference at the base; and Damory's Oak, in Dorsetshire (see p. 1758.), was 68 ft. in circumference within the hollow.

The largest Oaks still existing. These appear to be, the Salcey Oak, in Northamptonshire, with a trunk 46 ft. in circumference; the Grindstone Oak, in Surrey, 48 ft.; the Hempstead Oak, in Essex, 53 ft.; the Merton Oak, in Norfolk, 63 ft.; and the Cowthorpe Oak, in Yorkshire (*fig.* 1624.), 78 ft.

Oaks remarkable for their horizontal Expansion. The Three-shire Oak, near Worksop, was so situated that it covered part of the three counties of York,



1624

Nottingham, and Derby, and dripped over 777 square yards. An oak between Newnham Courtney and Clifton shaded a circumference of 560 yards of ground, under which 2420 men might have commodiously taken shelter. The immense Spread Oak in Worksop Park, near the white gate, gave an extent, between the ends of its opposite branches, of 180 ft. It dripped over an area of nearly 3000 square yards, which is above half an acre; and would have afforded shelter to a regiment of nearly 1000 horse. The Oakley Oak, now growing on an estate of the Duke of Bedford, has a head 110 ft. in diameter. The oak called Robur Britannicum, in the park at Rycote, is said to have been extensive enough to cover 5000 men; and at Ellerslie, in Renfrewshire, the native village of the hero Wallace, there is still standing "the large oak tree" (see p. 1772.), among the branches of which it is said that he and 300 of his men hid themselves from the English.

Size of Oaks, as compared with that of other Objects. "The circle occupied by the Cowthorpe Oak," says Professor Burnet, "where the bottom of its trunk meets the earth, exceeds the ground plot of that majestic column of which an oak is confessed to have been the prototype, viz. Smeaton's Eddystone Lighthouse. Sections of the trunk of the one would, at several heights, nearly agree with sections of the curved and cylindrical portions of the shaft of the other. The natural caverns in Damory's and other oaks were larger than the chambers alluded to, as horizontal slices of the trunk would be considerably too large to floor any of them. The hollow space in Damory's Oak was, indeed, 3 ft. wider than the parish church of St. Lawrence, in the Isle of Wight. Arthur's round table would form an entire roof, or projecting capital, for the lighthouse: indeed, upon this table might be built a round church, as large as that of St. Lawrence, in the Isle of Wight, before alluded to, and space to spare; so that, if the extent of the sap wood be added, or the ground plot of the Cowthorpe Oak be substituted for Arthur's table, there would be plenty of room, not only to build such a parish church, but to allow space for a small cemetery beside it. Indeed," continues Burnet, "with reference to

this last-named oak, and also to the German tree castles, and hermit's cell and chapel, I would merely observe that St. Bartholomew's, in the hamlet of Kingsland, between London and Hackney, which, beside the ordinary furniture of a place of religious worship, viz. desks for the minister and clerk, altar, staircase, stove, &c., has pews and seats for 120 persons (upwards of 100 have been in it at the same time; and, a few weeks ago, the author (writing in 1829) made one of a congregation therein assembled of nearly 80: 76 or 77 were counted; when the pews were by no means crowded, and plenty of room left vacant): still this chapel is nearly 9 ft. less in width, and only 17 in. more in length, than the ground plot of the Cowthorp Oak. In fact, the tree occupies upwards of 30 square feet more ground than does the chapel. The Duke's Walkingstick, in Welbeck Park, was higher than the roof of Westminster Abbey. The long oaken table in Dudley Castle (a single plank cut out of the trunk of an oak growing in the neighbourhood) measured considerably longer than the bridge that crosses the lake in the Regent's Park; and the famous roof of Westminster Hall, the span of which is among the greatest ever built without pillars, is little more than one third the width of the Worksop Spread Oak; the branches of which would reach over Westminster Hall, placed on either side of its trunk, and have nearly 32 ft. to spare; and its extent is nearly 30 ft. more than the length, and almost four times the width, of Guildhall, in the city of London. The rafters of Westminster Hall roof, though without pillars, have massive walls on each side to support them; but the tree boughs, of 16 ft. more extent, are sustained at one end only. Architects, who know the stress a staircase of even 8 ft. or 10 ft. in width has upon the wall into which the side is built, can alone fairly estimate the excessive purchase which branches on either side, spanning from outbough to outbough 180 ft., must have on the central trunk." (*Burgess's Eidodendron.*) In Hunter's *Evelyn* is mentioned, " the strange and incredible bulk of some oaks growing in Westphalia, whereof one served both for a castle and a fort; and another there, which contained in height 130 ft., and, as some report, 30 ft. in diameter." (vol. ii. p. 185.)

Timber produced by single Oak Trees. Bridge, in his *History of Northamptonshire*, records that one of the rooms in the house of Sir John Dryden, at Ashby Canons, 30 ft. long and 20 ft. wide, was entirely floored and wainscoted from a single oak; and the same is said to have been the case with a room, 42 ft. long and 27 ft. broad, in the mansion at Tredegar Park. These must have been noble trees, yet still inferior to the large Gelonos Oak, felled in Monmouthshire, A. D. 1810; and which has been often cited as an example of vast ligneous production. The bark, Burnet says, he has been informed from a memorandum furnished to Mr. Burgess (the artist, and author of *Eidodendron*), was sold by the merchant for the scarcely credible sum of 200*l.* This oak was purchased by Mr. Thomas Harrison for 100 guineas, as stated in the *Gentleman's Magazine* for 1817, under the apprehension of its being unsound; but Burnet tells us that it was resold, while still standing, for 405*l.*; and that the cost of converting it was 82*l.*; amounting altogether to 487*l.*: it was subsequently resold for 675*l.* There were at least 400 rings, or traces of annual growth, within its mighty trunk. The above far exceeded the contents of the oak felled in Lord Scarsdale's park, at Kedleston, in 1805 (an account of which is given in Farey's *Derbyshire Reports*); although that was a very fine tree, containing 550 ft. of timber, and sold, with its 9 tons of bark (green), top and lop, roots, &c., for upwards of 200*l.* And even the great Middlesceugh Oak, the property of Sir F. Vane, Bart., was far inferior. This tree was felled in 1821, and contained 670 ft. of solid wood: it yielded a ton of bark, and was said to have required 13 waggons to move it." (*Amœn. Quer.*, fol. 15.) The Gelonos Oak mentioned above, which was cut down in 1810, grew about four miles from Newport, in Monmouthshire. The main trunk was 10 ft. long, and produced 450 cubic feet of timber; 1 limb, 355 ft.; 1 ditto, 472 ft.; 1 ditto, 113 ft.; and 6 other limbs, of inferior size, averaged 93 ft.

each; making a total of 2426 cubic feet of convertible timber. The bark was estimated at 6 tons; but, as some of the very heavy body bark was stolen out of the barge at Newport, the exact weight is not known. Five men were 20 days stripping and cutting down this tree; and two sawyers were 5 months converting it, without losing a day, Sundays excepted. The main trunk was 9½ ft. in diameter; and, in sawing it through, a stone was discovered 6 ft. from the ground, above a yard in the body of the tree, through which the saw cut. The stone was about 6 in. in diameter, and was completely shut in; but around it there was not the least symptom of decay. The rings in the but were carefully counted, and amounted to upwards of four hundred in number; a convincing proof that this tree was in an improving state for upwards of four hundred years; and, as the ends of some of its branches were decayed, and had dropped off, it is presumed that it had stood a great number of years after it had attained maturity. (*Literary Panorama* for August, 1815; and *Gent. Mag.* for October, 1817, p. 305.) The Northwick Oak, Blockley, Worcestershire, which, when felled, was about 300 years old, had a girth, at 5 ft. from the ground, of 21 ft.; its smallest girth was 18 ft.; height to the branches, 30 ft.; solid contents of the body, 234 ft.; and of the arms, 200 ft. (*Gent. Mag.*, 1791, p. 612.) The oak which was felled in Withy Park, near Wenlock in Shropshire, in 1697, spread 114 ft.: the trunk was 9 ft. in diameter, exclusive of the bark. "It contained 24 cords of yard wood, 11½ cords of 4 ft. wood; 252 park pales 6 ft. long; 1 load of cooper's wood; 6½ tons of timber in the boughs; 28 tons of timber in the body; and all this besides faggots, notwithstanding several boughs had dropped off in Mr. Wilde's father's and grandfather's time. The stem was so wide, that two men could thrash on it without striking each other. Several trees which grew at Cunsborough were bought by a cooper at 10*l.* per yard, for 9 ft. or 10 ft. high; and Ralph Archdall felled a tree in Sheffield Park of 13 ft. diameter at the kerf; and there was another, standing near the old ford, of 10 yards in compass." (*Hunt. Evel.*, ii. p. 194.) In the hall in Goodrich Castle, Herefordshire, there is, says Grose, a beam of oak, without a knot, 66 ft. long, and near 2 ft. square the whole length. Evelyn mentions a large oaken plank, cut from a tree felled by his grandfather's order, at Wootton, 5 ft. wide, 9 ft. 6 in. in length, and 6 in. thick, all entire and clear; and Dr. Plot notices a table in Dudley Castle hall, already mentioned (p. 1777.), which was cut out of a tree which grew in the park, all of one plank, above 75 ft. long, and 3 ft. wide throughout its whole extent; and which, being too long for the castle hall, 7 yards 9 in. were obliged to be cut off. The mainmast of the Royal Sovereign, built in Charles I.'s time, was 100 ft. long, save one, and within 1 in. of a yard in thickness, all of one piece of oak: several of the beams of the same ship were 44 ft. in length, 4 of which were cut from an oak which grew in Framlingham, in Suffolk. Marcennas states that the great ship called the Craven, which was built in France, had its keel timbers 120 ft. long, and the mainmast 85 ft. high, and 12 ft. in diameter at the base. An oak is mentioned as fallen in Sheffield Park, of so great a girth, that, when the trunk lay flat on level ground, two men on horseback, on opposite sides, could not see the crowns of each other's hats. Dr. Plot records a similar circumstance as noticed of another immense oak at Newbury, which, he says, was 15 yards in girth. The Lord's Oak, at Rivelin, was 12 yards about, and the top yielded 21 cords of wood; its diameter, 3 yards 28 in. The Lady Oak was 5 ft. square for 40 ft., contained 42 tons of timber, and its boughs gave 25 cords of fuel; and another, in the Hall Park, close by, gave 18 yards, without bough or knot; being 3 ft. 6 in. square at top, and not much bigger near the root. Arthur's round table must, as Gilpin observes, have been cut from a tree of immense girth, as it measures, according to Grose, 18 ft. in diameter. Now, this is 18 ft. of solid heart wood; and, if the depth of sap wood, in which it must have been environed, be taken into the account, we shall have the dimensions of a most enormous tree. Out of such oaks as these must those ancient canoes, described by Sir Joseph Bankes as exhumed

in Lincolnshire, have been excavated. (*Amœn. Quer.*) "It is recorded in the *Annual Register* for 1796, that some labourers, while digging for a fish-pond in the grounds of Lord Grenville, at Dropmore, discovered a great number of oaks buried 10 ft. or 12 ft. deep in the earth, and averaging 50 ft. long, all perfectly sound timber. At Litchett Park, in 1740, an oak was discovered 3 ft. under ground, which measured 53 ft. in length, and gave 4 ft. at the side of the square: there were 33 ft. more of top raised afterwards; so that the whole oak was 86 ft. long. In the year 1815, there was a part of an oak drawn out of the Thames, near the ferry at Twickenham, with great difficulty, by 24 horses. It measured 20 ft. in circumference; and Philips says, it is known to have lain in the river upwards of 150 years. Among the vast quantities of bog timber annually raised out of the fens in Lincolnshire, a few years ago one log was taken up, near Sleaford, that contained 300 solid feet of timber; and, in the year 1811, one was dug up that contained 400 solid feet." (*Amœn. Quer.*, fol. 15.)

Bull Oaks. These are all very old trees, and hollow; and they are called bull oaks, from bulls taking shelter within them, which they effect, not by going in and turning round, but by retreating backwards into the cavity till the head alone projects at the aperture. Mr. South, in the *Bath Society's Papers*, 1783, describes an ancient hollow tree, in the middle of a pasture, and bearing the most venerable marks of antiquity, which gives the name, compounded of itself and its situation, to the farm on which it grows, viz. Oakley Farm. The hollow part of this tree was long the favourite retreat of a bull; and 20 people, old and young, have crowded into it at one time. A calf being shut up there for convenience, its dam, a two-years-old heifer, constantly went in to suckle it, and left sufficient room for milking her. It is supposed, adds he, to be near 1000 years old: the body is nothing but a shell, covered with burly protuberances. The upper part of the shaft is hollow, like a chimney. It has been mutilated of all its limbs; but from their stumps arise a number of small branches, forming a bushy head, so remarkable for fertility, that, in years of plenty, it has produced two sacks of acorns in a season. It measured in the middle, round the burls, 29 ft. 3 in.; round the stumps of the old arms, 31 ft. 6 in.; and in the smallest part, between 2 ft. and 3 ft. from the ground, it is 26 ft. in circumference. The aperture into the tree is a small ill-formed Gothic arch, which appears to have been originally "hewn out or enlarged with an axe; and the bark," continues Mr. South, "now curls over the wound; a sure sign that it continues growing." (*Bath Soc. Papers*, vol. vi. p. 45.) There are many bull oaks in different parts of the country; but that in Wedgenock Park (*fig.* 1625.) is, probably, one of the largest. It has been long since fenced round with substantial posts and rails, and has had the two extremities of its projecting limbs supported from beneath by strong pieces of timber. (See *Mag. Nat. Hist.*, vol. iii. p. 553.)

Boundary Oaks. Several of these might be mentioned. The Border Oak, which stands on the confines of Wales and England, is more remarkable for its situation than for its size: it forms the boundary between Shropshire and the Principality, as the County Oak, about 30 miles from London, does between Surrey and Sussex. The last-named tree is hollow, and contains within it seats for nine persons. The Gospel Oak, *fig.* 1628., is a boundary oak dividing the parish of Stoneleigh in Warwickshire, from the parish of Baginton. There are many Gospel Oaks in different parts of England, relics, as the Rev. W. T. Bree observes (*Mag. Nat. Hist.*, vol. iii. p. 553.), of the religion of our ancestors: —

"Relligione patrum multos servata per annos." VIRGIL.

The custom, says Mr. Strutt, "of marking the boundaries of parishes, by the inhabitants going round them once every year, and stopping at certain spots to perform different ceremonies, in order that the localities might be impressed on the memories of both young and old, is of great antiquity, and may be

1625

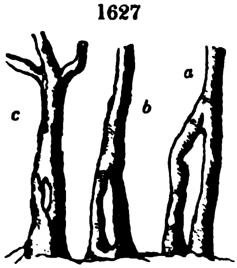


traced back to the time of the Romans, who observed a similar custom at the annual festivals called Terminalia, held in honour of the god Terminus who was considered as the guardian of fields and landmarks, and the promoter of friendship and peace among men. It was introduced among Christians about the year 800, by the pious Avitus, bishop of Vienna, in a season of dearth and calamity, and has been continued since his time by the different clergy; the minister of each parish, accompanied by his churchwardens and parishioners, going round the bounds and limits of his parish in Rogation Week, or on one of the three days before Holy Thursday (the feast of our Lord's Ascension), and stopping at remarkable spots and trees to recite passages from the Gospels, and implore the blessing of the Almighty on the fruits of the earth, and for the preservation of the rights and properties of the parish." (*Mag. Nat. Hist.*, iii. 558.) The Plestor Oak, described in White's *Selborne*, was also a boundary tree, used to mark the extent of the *Pleystow*, or play-place for the children of the village. This oak is described by White as having " a short squat body, and huge horizontal arms extending almost to the extremity of the area; surrounded with stone steps, and seats above them, the delight of old and young, and a place of much resort in summer evenings; where the former sate in grave debate, while the latter frolicked and danced before them."

1626



1627



Oak Trees with conjoined Trunks. The following instances of this singular conformation are from trees growing in Ryton Wood, Warwickshire, the property of W. Dilke, Esq.; and we are indebted for them to the Rev. W. T. Bree. *Figs.* 1626. and 1627. are illustrative of only four trees; *a* and *aa* being two

1628



views of the same trunk. A smaller tree, growing near this one, and represented by *b*, has the junction of the trunks nearer the ground. Another specimen, growing near a farm-house, is represented by *d*; and a fourth one by *c*. All these oaks are within a short distance of each other; and Mr. Bree thinks the trunks were probably joined artificially by some one who had a fancy for such experiments. They are all of the species *Q.* pedunculàta. The figures are to a scale of 1 in. to 12 ft.

Oaks conjoined with other Trees. The oak being a tree of great duration, and its trunk, in the course of years, spreading wider than that of many trees, not unfrequently grows round the stems of trees which grow close by it; or, its trunk becoming hollow, and the head being broken off by storms, other trees frequently spring up within it, and produce a flourishing head encased with an oak trunk. Hence, we have an oak conjoined with an ash near the lake at Welbeck, figured in Rooke's *Remarkable Oaks*, &c., pl. 6. This ash grows out of the bottom of a large oak, "to which it adheres to the height of about 6 ft.; it there separates, and leaves a space of nearly 3 ft. in height. Here, as if unwilling to be disunited, it stretches out an arm, or little protuberance, to coalesce again with the fostering oak." At Bearwood, near Reading,

the seat of John Walter, Esq., M.P., there is a large oak with a beech growing from its root. In Needwood Forest, there were, in 1806, many large hollies growing out of oaks; and nothing is more common in the New Forest, than to see oaks and thorns growing apparently from the same root. In Kinmel Park, Denbighshire, there is a sycamore, a large tree, growing out of a hollow oak: and at Ribbesford, near Bewdley in Worcestershire, there is a yew tree, with a trunk 2 ft. in diameter, completely cased in the trunk of a pollard oak; the hollow cylinder of the oak being filled up with the body of the yew tree, to the height of 18 ft. or 20 ft.; after which the two trees entwine their branches in the most friendly manner possible. On the river Loddon, in Berkshire, not far from Forest Hill, there was, in 1818, a handsome oak tree growing out of a pollard willow. Elders growing out of decaying oaks, and also mountain ash, and other trees and shrubs which spring from berries eaten by birds, are common. Dr. Plot mentions a thorn enclosed in an oak at Drayton Basset, the branches of which seemed to pass through the trunk of the oak in several places.

Oaks of remarkable Origin. In Deene Park, Northamptonshire, the seat of the Earl of Cardigan, there is an oak growing in the pleasure-ground, which was produced from an acorn found in the middle of a large piece of oak timber, sawn in Woolwich dockyard; and which was planted here, in 1757, by the late Dowager Duchess of Buccleugh, when Lady Elizabeth Montague. This tree, though nearly 100 years old, is of small dimensions, in consequence of the very bad situation in which it is planted; being near a sheet of water, and on a sandy rock full of springs. Its extreme height is 55 ft., and the diameter of the trunk, at 3 ft. from the ground, is 1 ft. 4 in. The species is Q. sessiliflòra.

Curious Circumstances connected with Oak Trees. Major Rooke mentions that, in cutting down some trees in the wood of Birkland, or Birchland, in Sherwood Forest, letters, &c., were found within the wood of several oaks, marking the king's reign. In one tree, cut down in 1786, were found J. R., supposed to signify James Rex; and in another, W. M., with a crown, for William and Mary; and in a third, Joh. Rex, with several marks something like the old crown in prints of King John; but Major Rooke observes that the crown is not sufficiently made out for him to insert it as a fact. The letters were about 1 ft. within the tree, and above 1 ft. from the centre. Crucifixes, images, &c., have been found in similar situations, enclosed in the like manner. Often dead branches of trees, when small, are thus enclosed, and grown over by the parent trunk. Professor Burnet observes that "Queen Anne's and Queen Charlotte's Oaks in Windsor Forest, both of which have had brass plates, with commemorative inscriptions thereon, fixed to them, might be given as further illustrations. Over the edges of these plates the yearly increasing bark has already made considerable encroachments, and, in due course of time, will progressively enclose the whole. To this process do we owe that more noted and variegated texture of the central parts of planks, on which much of the beauty of heart wood depends; for the small branches, knots, and nodes of young trees, which detruded themselves near the ground, being, in process of growth, broken off or destroyed, their relics or rudiments are in like manner enclosed, and thus buried in the heart of aged trees. Sir John Clarke mentions that the horn of a large deer was found embedded in the heart of an oak, which was discovered on cutting down the tree; and that it was found fixed in the timber by large iron cramps: it seems, therefore, that it had been first fastened on the outside of the tree, which, in growing afterwards, had enclosed the horn." (*Amœn. Quer.*)

Raining Oak Trees. All trees, especially those of great height, in insulated situations, condense the watery vapour of the atmosphere; and, when this is very abundant, it falls from the leaves in drops like rain. The elm and the poplar (as already mentioned, p. 1667.), being tall trees, afford familiar illustrations of this; but the oak, also, occasionally exhibits the same phenomenon.

White, in his *Natural History of Selborne* (see Brown's edit., p. 195.), mentions, in a letter to Mr. Pennant, an oak in Newton Lane, which, on a misty day in October, 1775, dropped so fast, that the cartway stood in puddles, and the ruts ran water, though the ground in general was dusty.

Progress of Oaks from the Acorn. An oak, sprung from an acorn set by Robert Marsham, Esq., at Stratton Strawless, near Norwich, A. D. 1719, measured, in the spring of 1743, when 24 years old, 1 ft. 7 in. in girt at 5 ft. from the ground; and in 1758, when 41 years old, its girt at the same height was 2 ft. 8¼ in.; having increased 1 ft. 1¼ in. in girt, and something more than 2 ft. 3 in. in solid contents, during 15 years. This oak, we are informed by Robert Marsham, Esq., the grandson of the planter of the tree, was, in December, 1836, 13 ft. in circumference at 5 ft. from the ground, and 17 ft. at 1 ft.; with a trunk 19 ft. long clear of branches, and a remarkably handsome head; it was 64 ft. high. Two oaks, planted by Mr. Marsham in 1720 and 1721, in 1743 measured 2 ft. 9⅝ in., and 2 ft. 11¼ in. in circumference at 5 ft. high; and had increased 1 ft. 11⅞ in. and 2 ft. 2 in. respectively in girt, and 9 ft. 1 in. and 10 ft. 3 in. in solid contents, during 15 years; while two oaks, about 60 or 80 years of age, which, in 1743, girted 6 ft. 3⅝ in. and 9 ft. 4½ in., measured, in the autumn of 1758, 7 ft. 8⅝ in., and 10 ft. 1 in.; having increased only 1 ft. 5 in. and 8½ in., in their respective circumferences, in 15 years; although their solid contents exceeded in increase the younger trees, being, in the sixty-year oak, 12 ft. 1 in., and in the eighty-year oak, 16 ft. 1 in. and upwards; the height of this tree in February, 1837, Mr. Marsham inform us, was exactly 92 ft. An acorn, writes Dr. Plot, which was set in a hedgerow, between Colton and Blithfield, by Ralph Bates, grew to a stout oak, being 2 ft. square at the but end, within the life of its planter, who outlived its felling. The first 10 ft. were sawn into boards, and used for building: it contained nearly a ton of timber. An oak which was planted at Denham Rectory, Bucks, in 1750, girted, at its smallest part, 8 ft. in 1817, being then but 67 years of age: the total height was 50 ft., and the diameter of its head about 70 ft. In the garden at Sheffield Place, Sussex, stands a fine oak, which was set in the year 1745; and in 1815, when 70 years old, its trunk was 12 ft. in circumference, its clear bole 10 ft.; at which height it divided into branches that overspread an area of 75 ft. in diameter. An acorn was sown at Rickett, the seat of Lord Barrington, on the day of his birth in 1717. In November, 1790, it contained 95 ft. of timber, which, at 2*s.* per foot, would sell for 9*l.* 10*s.* The top was valued at about 1*l.* 15*s.* The girt, at 5 ft. from the ground, was about half an inch more than 8 ft. The increase of the girt, in the two last years, was 4½ in. It grows in rich land, worth 1*l.* 5*s.* an acre. (*Bath. Soc. Pap.*, &c.)

Rate of Growth of the Oak. An oak, in a good soil and situation, will, in 75 years from the acorn, contain a ton of timber. (*South* in *Bath Soc. Pap.*, vi. p. 37.) The same oak, at 150 years of age, will contain upwards of 8 tons of timber, or about 12 loads of square timber. (*Id.*, p. 38.) An oak, planted by Mr. Marsham in 1720, was, in 1794, 74 years afterwards, about 8 ft. in circumference at 14 ft. from the ground. The soil had been prepared and manured. In the first 36 years of its growth, this tree gained 1½ in. in circumference yearly. The growth of a middle-aged oak is generally from 1¼ in. to 1 in. in circumference yearly; between its twentieth and its hundredth year, it sometimes exceeds this measure, and, in its second century, falls within it; but, as the solidity of the shaft consists less in its length than in the square of diameter in the girting place, a small addition to the diameter there enlarges the square abundantly. Wherefore, though the circumference from the 100th to the 150th year may not increase so fast as it did to the 100th, the solid contents will be increasing faster; for, as the square of the diameter (40=1600) exceeds the square of 24=576, so will the contents in the 150th year exceed the contents in the 100th, when its annual enlargement was ⅛ in. greater. (*Id.*, p. 50.) According to the Rev. Richard Yates, writing after "a sedulous and active experience of 50 years," by choosing a deep loamy

soil for the oak, by deeply trenching it, by planting acorns, and not plants; and by keeping them pruned till they arrive at a proper height, double the quantity of timber may be obtained in about 50 years, that is now produced in 100. Mr. Yates's mode of cultivation (for an account of which he received a premium from the Society of Arts) will be found in a succeeding paragraph. (See *Gent. Mag.*, vol. lxxiv., for 1804, p. 626.)

The following table of the progressive growth of nine oaks in the New Forest, was communicated by T. Davies, Esq., of Portway House, Wiltshire:—

		The circumference taken in inches at 6 ft. from the ground.					
		1814.	1816.	1818.	1820.	1822.	
5 Trees planted 120 years.	No. 1.	57[illegible]	58[illegible]	58[illegible]	59[illegible]	59[illegible]	Average increase in 8 years, 3¾ in. per tree in circumference. Increase of timber in 12 ft. in length of trunk, 1 ft. 9 in.
	No. 2.	65[illegible]	66[illegible]	66[illegible]	67[illegible]	68[illegible]	
	No. 3.	82[illegible]	85	85[illegible]	86[illegible]	87[illegible]	
	No. 4.	41	42[illegible]	42[illegible]	42[illegible]	43[illegible]	
	No. 5.	61	62[illegible]	63	63[illegible]	67[illegible]	
	Aggregate	307[illegible]				326[illegible]	
4 Trees planted, 60 years.	No. 6.	28[illegible]	30[illegible]	32	33[illegible]	35[illegible]	Average increase in 8 years, 5¼ in. per tree in circumference. Increase of timber in 12 ft. in length of trunk, 1 ft. 7 in.
	No. 7.	27[illegible]	28[illegible]	29[illegible]	29[illegible]	32	
	No. 8.	28[illegible]	29[illegible]	30[illegible]	31[illegible]	32[illegible]	
	No. 9.	33[illegible]	34[illegible]	35[illegible]	37[illegible]	39	
	Aggregate	117[illegible]				138[illegible]	

Relative Growth of Oak Wood, as compared with that of other Trees. The result of observations by Vancouver in Hampshire, as to the relative growth of wood in that county, was, taking the trees at 10 years' growth, and fixing the oak as a standard, as follows: — Oak, 10; elm, 16; ash, 18; beech, 20; white poplar (*P. álba*), 30. It will thus appear that the oak, which is the slowest-growing forest tree indigenous to Britain, increases only at the rate of one third part of the white poplar, which is the most rapid-growing indigenous forest tree in Britain.

The growth of the oak, as compared with that of the larch, is exemplified in a tree of each growing at Wimbush, in Essex. In 1792, the oak, which is called Young's Oak, at 5 ft. from the ground, was 8 ft. 5¾ in. in girt; and a larch, at the same place, only 12 years old, at the same height from the ground, girted 2 ft. 4 in. In 1805, 13 years afterwards, the oak had increased only 4½ in. in girt, while the larch had increased 2 ft. 9 in. (*Young's Essex*, ii. p. 151.)

Poetical Allusions. The most celebrated poetical description of the oak, as well as, perhaps, one of the oldest, is that of Virgil in the second *Georgic*, which has been thus rendered by Dryden: —

——— " Jove's own tree,
That holds the woods in awful sovereignty,
Requires a depth of lodging in the ground,
And, next the lower skies, a bed profound.
High as his topmost boughs to heaven ascend,
So low his roots to hell's dominion tend;
Therefore nor winds, nor winter's rage, o'erthrows
His bulky body, but unmoved he grows.
For length of ages lasts his happy reign,
And lives of mortal men contend in vain.
Full in the midst of his own strength he stands,
Stretching his brawny arms, and leafy hands:
His shade protects the plains, his head the hills commands."

The following lines are from the *Æneid*: —

" As when the winds their airy quarrel try,
Jostling from every quarter of the sky,
This way and that, the mountain oak they bend,
His boughs they shatter, and his branches rend;
With leaves and falling mast they spread the ground;
The hollow valleys echo to the sound:
Unmoved the royal plant their fury mocks,
Or, shaken, clings more closely to the rocks;
For as he shoots his towering head on high,
So deep in earth his fixed foundations lie."

VIRGIL. *Æn.*, Dryden's trans.

So many British poets have celebrated the oak; and its beauty, dignity, and strength have afforded so many fine similes; that we are compelled to make a selection, and shall first give extracts from three of our oldest and most popular poets; viz. Chaucer, Spencer, and Shakspeare.

> " And to a pleasant grove I 'gan to passe,
> Long er the bright sunne uprise was;
> In which were okes great, straight as a line,
> Under the which the grasse, so fresh of hew,
> Was newly sprong, and an eight foot, or nine,
> Every tree well fro his fellow grew,
> With branches brode, laden with leves new,
> That sprongen out agen the sunne shine;
> Some very red, and some a glad bright green." CHAUCER.

> " There grew an aged tree on the green;
> A goodly oak some time had it been,
> With arms full strong, and largely display'd,
> But of their leaves they were disarray'd:
> His body big, and mightily pright,
> Thoroughly rooted, and of wond'rous height:
> Whilome had been the king of the field,
> And mochel masts to the husband did yield,
> And with his nuts larded many swine;
> But now the grey moss marr'd his rine;
> His bared boughs were beaten with storms,
> His top was bald, and wasted with worms.
> . . . .
> For it had been an ancient tree,
> Sacred with many a mystery." SPENSER'S *Shepherd's Calendar.*

> " Under an oak, whose antique root peeps out
> Upon the brook that brawls along this wood;
> . . . . . .
> Whose boughs were moss'd with age,
> And high top bald with dry antiquity." SHAKSPEARE.

To these we add extracts, relating to trees we have already described, from Cowper's *Yardley Chase*, Mundy's *Needwood Forest*, and Carrington's *Dartmoor*. For the Yardley Oak, see p. 1764.

> " Thou wert a bauble once, a cup and ball,
> Which babes might play with; and the thievish jay
> Seeking her food, with ease might have purloin'd
> The auburn nut that held thee, swallowing down
> Thy yet close-folded latitude of boughs,
> And all thy embryo vastness, at a gulp.
> . . . .
> Time made thee what thou wert — king of the woods!
> And time hath made thee what thou art — a cave
> For owls to roost in! Once thy spreading boughs
> O'erhung the champaign, and the numerous flock
> That grazed it stood beneath that ample cope
> Uncrowded, yet safe-shelter'd from the storm.
> No flock frequents thee now: thou hast outlived
> Thy popularity, and art become
> (Unless verse rescue thee awhile) a thing
> Forgotten, as the foliage of thy youth!
> . . . .
> Embowell'd now, and of thy ancient self
> Possessing nought but the scooped rind, that seems
> A huge throat calling to the clouds for drink,
> Which it would give in rivulets to thy roots:
> Thou temptest none, but rather much forbid'st
> The feller's toil, which thou couldst ill requite.
> Yet is thy root sincere, sound as the rock:
> A quarry of stout spurs and knotted fangs,
> Which, crook'd into a thousand whimsies, clasp
> The stubborn soil, and hold thee still erect.
> Thine arms have left thee — winds have rent them off
> Long since; and rovers of the forest wild
> With bow and shaft have burnt them. Some have left
> A splinter'd stump, bleach'd to a snowy white;
> And some, memorial none where once they grew.
> Yet life still lingers in thee, and puts forth
> Proof not contemptible of what she can,
> Even where death predominates. The spring
> Finds thee not less alive to her sweet form,
> Than yonder upstarts of the neighbouring wood,
> So much thy juniors, who their birth received
> Half a millennium since the date of thine." COWPER'S *Yardley Chase.*

The lines from *Needwood Forest* allude to the Swilcar Oak. (p. 1769.)

"First blush the hills with orient light,
And pierce the sable veil of night;
Green bends the waving shade above,
And glittering dew drops gem the grove:
Next shine the shelving lawns around,
Bright threads of silver net the ground;
And down, the entangled brakes among,
The white rill sparkling winds along:
Then as the panting zephyrs breathe
The billowy mist recedes beneath;
Slow, as it rolls away, unfold
The vale's fresh glories, green and gold;
Dove laughs, and shakes his tresses bright,
And trails afar a line of light:
High midst the trees, with many a frown,
Huge Swilcar shakes his tresses brown;
Outspreads his bare arms to the skies,
The ruins of six centuries." MUNDY'S *Needwood Forest*.

The following lines are descriptive of Wistman's Wood. See p. 1757.

——" How heavily
That old wood sleeps in the sunshine — not a leaf
Is twinkling — not a wing is seen to move
Within it; but below, a mountain stream,
Conflicting with the rocks, is ever heard,
Cheering the drowsy noon. Thy guardian oaks,
My country, are thy boast — a giant race,
And undegenerate still; but of this grove,
This pygmy grove, not one has climb'd the air
So emulously that its loftiest branch
May brush the traveller's brow. The twisted roots
Have clasp'd in search of nourishment the rocks,
And straggled wide, and pierced the stony soil
In vain: denied maternal succour, here
A dwarfish race has risen. Round the boughs
Hoary and feeble, and around the trunks,
With grasp destructive, feeding on the life
That lingers yet, the ivy winds, and moss
Of growth enormous. E'en the dull vile weed
Has fix'd itself upon the very crown
Of many an ancient oak; and thus, refused
By nature kindly aid — dishonoured — old —
Dreary in aspect — silently decays
The lonely wood of Wistman." CARRINGTON'S *Dartmoor*, p. 56.

Through the kindness of His Grace the Duke of Bedford, we have received the following additional information respecting this remarkable wood, from Archdeacon Froude, vicar of Darlington, near Totness: — "I have been told that there is an ancient record in the Duchy Office, which probably refers to their existence, not long after the Conquest. On the bottom stock of one of them, cut down partly for the purpose, I counted upwards of 250 concentric rings, when the farther evidence of annual formations in the exterior circumference was too indistinct to be noticed. When first felled, the specific gravity of the wood was more like that of tropical than English growth. The extent of Wistman's Wood is about two acres."

Properties and Uses. In comparing the wood of *Q.* pedunculàta and *Q.* sessiliflòra, the former is found the most easy to split, and the stiffest and the easiest to break, and yet the most difficult to bend; while the latter has the advantage over the other in toughness and weight. The following comparative view is from Hartig, as quoted in the *Dictionnaire des Eaux et Forêts*.

Q. PEDUNCULÀTA.	lb. oz.
The wood, when green, weighs	76 13
— half-dry	65 9
— perfectly dry	52 13
Its heating properties are, to the beech, as	1440 is to 1540
Its heating properties, compared with those of the *Q.* sessiliflòra, are as	1440 is to 1497
Its charcoal is, to that of the beech, as	1459 is to 1600

Q. SESSILIFLÒRA.	lb. oz.
The wood, when green, weighs	80 5
— half-dry	67 12
— perfectly dry	51 10
Its heating properties are, to the beech, as	1497 is to 1540
Its heating properties, compared with those of the *Q.* pedunculàta, are as	1497 is to 1440

It thus appears that the wood of both species loses above a third of its weight in drying; but, as in the case of every other wood, that of the oak is

more or less watery, according to the soil and locality in which it grows, and naturally weighs more from a warm climate and dry soil, and when the tree has attained its maturity, than under contrary circumstances.

Tredgold observes that the wood of the *Q.* sessiliflòra, which is of a darker colour than that of the *Q.* pedunculàta, is also heavier, harder, and more elastic. To ascertain their relative value, he tried an experiment, and the following table exhibits the results : —

	Q. PEDUNCULA'TA.	Q. SESSILIFLO'RA.
Specific gravity - - - - - - - - -	·807	·879
Weight of a cubic foot in lbs. - - - - - - -	50·47	54·97
Comparative stiffness, or weight that bent the piece 7-20ths of an inch	167	149
Comparative strength, or weight that broke the piece -	322	350
Cohesive force of a square inch in lbs. - - - - -	11592	12600
Weight of modulus of elasticity in lbs. for a square inch - -	1648958	1471256
Comparative toughness - - - - - - - -	81	108

" Each piece was 1in. square, and sustained by supports 2ft. apart, the weight being applied to the middle of the length. Both specimens broke short off without splitting : the *Q.* sessiliflòra bent considerably more at the time of fracture than the *Q.* pedunculàta. The strength, elasticity, toughness, and hardness of the sessile-fruited oak would render it," he continues, " superior for ship-building, were it not so inferior in durability between wind and water, to the *Q.* pedunculàta, or stalk-fruited kind." The wood of *Q.* pedunculàta, according to Atkinson (*Hort. Trans.*, 2d ser., vol. i. p. 336.), splits clean, and is best adapted for split paling, laths, barrel staves, dowels for flooring, and similar uses; and as it contains a greater quantity of the silver grain, or medullary rays, which, when the wood is planed, the workmen call the flower in the wood, it is more ornamental as furniture. The wood of *Q.* sessiliflòra, on the contrary, contains so small a portion of the silver grain, or flower, that wood of this species from old buildings has generally been mistaken for that of the sweet chestnut. This discovery was simultaneously made by Fougeroux and Daubenton about the year 1780. (See *Mém. Scien. Mathe. de l'Institut*, &c., 1. Trèm. 1807, p. 307.) Atkinson adds that the wood of *Q.* pedunculàta is stiffer than that of *Q.* sessiliflòra; and, though it may be broken with a less weight, yet it requires a much greater weight to bend it than *Q.* sessiliflòra does; and it is, therefore, better calculated for beams, or to bear the greatest weight in a building without bending. The wood of *Q.* sessiliflòra, according to Bosc and other French authors, though good for nothing for ship-building, because it soon rots under water, is of such great duration when kept dry, that the roofs of many of the old churches and cathedrals of France, which are framed of it, have lasted many centuries, without being in the slightest degree deteriorated. It also makes better fuel than that of *Q.* pedunculàta. Nichols appears to refer to *Q.* pedunculàta, when he speaks of " the true English oak, such as are standing about Rinefield Lodge," in the New Forest; " finer trees, or better timber for ship-building, than which, I believe," he adds, " are not to be found in the kingdom." Another oak, which, he says, " the workmen in the forest call the durmast oak," and which, from his reference to Miller's *Dictionary*, and his observations in another work, appears to be the *Q.* sessiliflòra, has the wood " not so strong, hard, or durable, as that of the English oak," which, he continues, " is well known all over the world as preferable for ship-building." The difference between the quality of these two kinds of oak, he adds, was not known in the year 1700, when some of the enclosures in the forest were planted with acorns taken from the durmast oak. (*Observations on Oak Trees, &c., in a Letter to the Earl of Chatham*, p. 26.) This durmast oak, he describes (in a *Letter on a new Way of planting Acorns*, &c., included in his *Methods for decreasing the Consumption of Timber in the Navy*, &c.) as having " the acorns in clusters close to the twig, without any footstalks; and the leaves with short stalks, usually about half an inch in length." (p. 67.) The acorns of the true English oak, on the other hand, he says, " grow on fruit stalks, like cherries, from about 1 in. to 2 in. in length;

and the leaves sit close to the twig, without the intervention of any footstalks." (p. 66.) This was published in 1793, a circumstance which we consider worthy of notice, as proving that the superiority of the timber of Q. pedunculàta was known to practical men before that period. In 1827, an experiment was made in the New Forest, Hampshire, with a piece of the best oak timber grown in the forest that could be procured. It was reduced to the dimensions of 5 in. square, and 11 ft. long, placed on two firm supports, exactly 11 ft. apart; and it was found that 4¾ tons 3 qr. 17 lb. were required to break the beam. The experiment was performed in the presence of Lord Lowther, at that time First Commissioner of Woods and Forests, and other government officers; and an account of it was laid before the Royal Institution in June, 1827.

Whatever may have been established theoretically respecting the comparative properties of the wood of the two species, yet, practically, they are almost alike employed both in territorial and naval constructions and machinery. The wood of the oak is more durable, in every state in which it can be placed, than that of any other tree which abounds in large quantities in Europe. It is hard, tough, tolerably flexible, strong, without being too heavy, not easy to splinter, and not readily penetrated by water; and hence its value in ship-building. Some woods are harder, but they are more fragile; and others are more flexible, but do not possess so much toughness, hardness, and durability. Where the grain is twisted, no timber is so well adapted for posts, either in house-building or in setting up mills, engines, or large machines. No wood lasts longer where it is subject to be alternately wet and dry; and oak piles have been known to endure many centuries. Shingles, pales, and laths last longer of this wood than of any other; and casks, and every other description of cooper's work, are most durable, and best adapted for containing wines, ales, and other liquors, when they are made of oak. Oak timber is particularly esteemed for the spokes of wheels, for which the small slow-growing oak of mountainous districts is greatly preferred to the more rapid-growing and larger oak of the valleys. Oaks of from 15 to 30 years' growth make the most durable poles. The young tree, when from 5 ft. to 10 ft. high, makes excellent hoops, which, Evelyn says, we ought to substitute for those of hazel and ash, as they are six times more durable: it also makes the very best walkingsticks, and very good handles to carters' whips. Of the roots, Evelyn says, were formerly made hafts to daggers, handles to knives, tobacco-boxes, mathematical instruments, tablets for artists to paint on instead of canvass, and elegant camleted joiners' work. Oak wood, every one knows, is preferred before all others for ship-building, in the temperate regions of both hemispheres. The Q. pedunculàta (the chêne blanc of the French), from its toughness, does not splinter when it is struck by a cannon ball, and the hole made by a ball is consequently much easier to plug up; but it is said, on the other hand, that this species, when it is grown in good soil, somewhat moist, contains a great deal of white or sap wood, which soon begins to decay, and, proceeding rapidly, ultimately destroys the heart wood. (*Nich. Obs.*, &c., p. 44.) Secondat (*Mém. du Chêne*, p. 3.) attributes the property of not splintering, when pierced with bullets, to the wood of Q. sessiliflòra; which, he says, the English had a great deal of formerly, and valued highly for the construction of ships, and which he describes as a tree attaining a prodigious size and height, and only succeeding in good soil: but, as these characters belong more to Q. pedunculàta than to Q. sessiliflòra, at least according to Willdenow, Bosc, and other authors, we conclude that Secondat has here mistaken the name of the kind to which he has assigned these properties. The best oak for ship purposes, according to Jaume St. Hilaire, is that which is grown in the south of France; and the best ships in the world, he says, are built in Toulon, or in Spain. The worst oak for ship-building, according to this author, is that sent to Britain from Dantzic, and other ports of the Baltic. The bark of both species is indiscriminately used for tanning, though that of Q. sessiliflòra is

said to be the best. The bark of either species affords a substance which has been substituted for quinine; and, according to Cullen and others, a decoction of oak bark has been used for diseases of the throat, &c. The bark which contains the greatest quantity of tannin is obtained from those parts of the branches or trunks which are of from 20 to 30 years' growth; and hence the bark of an oak coppice of 20 or 30 years' growth is worth more to the tanner, than the same weight of bark taken from the trunk and branches of old trees. Every part of the tree, however, abounds in astringent matter; and even the leaves and sawdust will tan leather, linen cloth, netting, or cordage, which is to be much exposed to the weather. An infusion of the bark, with copperas, dyes woollen of a purplish blue. The Highlanders, according to Lightfoot, dye their yarn of a brown colour with oak bark; and the same thing is practised in Sweden, and other countries, where, like the bark of the birch and some other trees, it is made to perform the office of tanning and dyeing at the same time. The acorns of both species are alike sought after for feeding swine; but, according to the French authors, they are produced in the greatest quantities by the sessile-fruited oak, and of the largest size from the pedunculated species. According to Evelyn, a peck of acorns a day, with a little bran, will make a hog increase a pound weight per day for two months together. Cato recommends acorns to be given to oxen, mixed with beans and lupines. In British parks, acorns form an important part of the winter food of deer; and, were the tree substituted for the elm, the ash, and a number of others which are planted in hedgerows, there would be a general supply throughout the country for pigs, and also for game; since it is certain that they are eaten both by pheasants and partridges in England, and by turkeys in America. Acorns are given raw or boiled to poultry; and it is said to be easy to accustom horses, cattle, and sheep to eat them. Acorns, roasted and treated like coffee, are said to afford a liquor which closely resembles that beverage; and when sprouted acorns are treated like malt, they afford a liquor from which a very strong spirit may be distilled. According to Bosc, this is practised in various parts of the north of Europe. The leaves of both species, gathered green, and dried, are said to furnish an excellent winter forage for sheep, goats, deer, &c. The leaves, after they have dropped from the tree, are swept up, and used in gardening as a substitute for tanner's bark, in producing heat by fermentation in hot-houses, pits, &c.

The Use of the Oak in Landscape has been pointed out by Gilpin with his usual force and effect. "It is a happiness," he says, "to the lovers of the picturesque, that this noble plant is as useful as it is beautiful. From the utility of the oak they derive this advantage, that it is every where found. Many kinds of wood are harder, as box and ebony; many kinds are tougher, as yew and ash; but it is supposed that no species of wood, at least no species of timber, is possessed of both these qualities together in so great a degree as the British oak. Almost all arts and manufactures are indebted to it; but in ship-building, and bearing burdens, its elasticity and strength are applied to most advantage. I mention these mechanical uses only because some of its chief beauties are connected with them. Thus, it is not the erect stately tree that is always the most useful in ship-building; but more often the crooked one, forming short turns and elbows, which the shipwrights and carpenters commonly call knee-timber. This, too, is generally the most picturesque. Nor is it the straight tall stem, the fibres of which run in parallel lines, that is the most useful in bearing burdens; but that which has its sinews twisted and spirally combined. This, too, is the most picturesque. Trees, under these circumstances, generally take the most pleasing forms. We seldom see the oak, like other trees, take a twisted form from the winds. It generally preserves its balance; which is one of the grand picturesque beauties of every tree. The oak, like other trees, shrinks from the sea air [see p. 195. fig. 1.]: but this indicates no weakness; for the sea air, like a pestilential disease, attacks the strongest constitutions. A second characteristic of the oak is the

stoutness of its limbs. We know tree, except, perhaps, the cedar of Lebanon, so remarkable in this respect. The limbs of most trees spring from the trunk: in the oak they may be rather said to divide from it; for they generally carry with them a great share of the substance of the stem. You often scarcely know which is stem and which is branch; and, towards the top, the stem is entirely lost in the branches. This gives particular propriety to the epithet 'fortes,' in characterising the branches of the oak; and hence its sinewy elbows are of such peculiar use in ship-building. Whoever, therefore, does not mark the 'fortes ramos' of the oak, might as well, in painting a Hercules, omit his muscles. But I speak only of the hardy veterans of the forest. In the effeminate nurslings of the grove we have not this appearance. There the tree is all stem drawn up into height. When we characterise a tree, we consider it in its natural state, insulated, and without any lateral pressure. In a forest, trees naturally grow in that manner. The seniors depress all the juniors that attempt to rise near them; but in a planted grove all grow up together, and none can exert any power over another. The next characteristic of the oak is the twisting of its branches. Examine the ash, the elm, the beech, or almost any other tree, and you may observe in what direct and straight lines the branches in each shoot from the stem; whereas the limbs of an oak are continually twisting here and there in various contortions, and, like the course of a river, sport and play in every possible direction; sometimes in long reaches, and sometimes in shorter elbows. There is not a characteristic more peculiar to the oak than this.

"Another peculiarity of the oak is its expansive spread. This, indeed, is a just characteristic of the oak; for its boughs, however twisted, continually take a horizontal direction, and overshadow a large space of ground. Indeed, where it is fond of its situation, and has room to spread, it extends itself beyond any other tree; and, like a monarch, takes possession of the soil. The last characteristic of the oak is its longevity, which extends beyond that of any other tree: perhaps the yew may be an exception. I mention the circumstance of its longevity, as it is that which renders it so singularly picturesque. It is through age that the oak acquires its greatest beauty; which often continues increasing even into decay, if any proportion exist between the stem and the branches. When the branches rot away, and the forlorn trunk is left alone, the tree is in its decrepitude — in the last stage of life, and all beauty is gone." Gilpin concludes this characteristic description with the following words: — "I have dwelt the longer on the oak, as it is confessedly both the most picturesque tree in itself, and the most accommodating in composition. It refuses no subject either in natural or in artificial landscape. It is suited to the grandest, and may with propriety be introduced into the most pastoral. It adds new dignity to the ruined tower and Gothic arch: by stretching its wild moss-grown branches athwart their ivied walls, it gives them a kind of majesty coeval with itself; at the same time, its propriety is still preserved, if it throw its arms over the purling brook, or the mantling pool, where it beholds

> 'Its reverend image in th' expanse below.'

Milton introduces it happily even in the lowest scene: —

> 'Hard by, a cottage chimney smokes
> From between two aged oaks.'"

Some valuable remarks on the picturesque beauty of the oak, and on its delineation, will be found in the *Magazine of Natural History*, communicated by Mr. Strutt, unquestionably the best delineator of trees in this or any other country. "European trees," he observes, "may by the painter be divided into four classes; the round-topped, as the oak, chestnut, elm, willow, ash, beech, &c.; the spiry-topped, as the different species of the fir tribe; the shaggy-topped, comprehending those of the pine; and the slender-formed, as the Lombardy poplar and the cypress. In the first of these classes, foremost in dignity and grandeur, the oak stands preeminent, and, like the lion among beasts, is the

1629



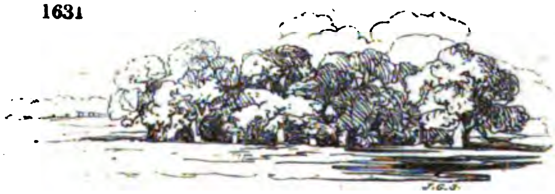
undoubted lord of the forest. Beauty, united with strength, characterises all its parts. The leaves, elegant in their outline, are strongly ribbed, and firmly attached to the spray, which, although thin and excursive, is yet bold and determined in its angles; whilst the abrupt and tortuous irregularity of its massive branches admirably contrasts with the general richness and density of its clustered foliage. Even as a sapling, in its slender gracefulness it exhibits sufficient firmness and indications of vigour to predicate the future monarch of the wood; a state, indeed, which it is slow to assume, but which it retains *per sæcula longa;* and when at length it is brought to acknowledge the influence of time, and becomes 'bald with dry antiquity,' no other production of the forest can be admitted as its rival in majestic and venerable decay. The general form of the oak is expansive, luxuriant, and spreading. Its character, both with respect to its whole and to its larger masses of foliage, is best expressed by the pencil, in bold and roundish lines, whether as single trees, as groups (*fig.* 1630.), or as forming the line of a distant forest (*figs.* 1629. and 1631.); although, when growing more closely together, they assume a loftier and less spreading appearance than the more solitary tree, such as Mason has so beautifully described in his *Caractacus:* —

1630



> —— 'Behold yon oak,
> How stern he frowns, and with his broad brawn arms
> Chills the pale plain beneath him!'"

1631



The sketches *figs.* 1632. and 1633., which are also drawn by Mr. Strutt, will more distinctly exemplify his position; exhibiting, in distinct distances, the same general appearance in the contour of the trees. Of these sketches,

1632



fig. 1632. is a scene in Savernake Forest, near Marlborough, in which the Creeping Oak (see p. 1771.) is shown in the foreground; and *fig.* 1633. is another scene in the same forest, in which the King Oak (see p. 1771.) forms

1633



the principal object. *Fig.* 1634. is a sketch of a singularly picturesque oak, adopted by Mr. Strutt as a vignette to his elegant work, *Deliciæ Sylvarum.*

1634



"But while," continues Mr. Strutt, "as an entire object, these curved lines are sufficient to express the general peculiarity of the outline of the oak, as well as the larger masses of its foliage, when we come to examine the tree more closely, and in detail, we find that a greater variety of line must be adopted to display its singular proportions, so indicative of energy and boldness. The trunk and limbs are characterised by their amazing strength, and by their comparative shortness and crookedness; and the branches, by their numerous contortions and abrupt angles, and by the great variety which they exhibit of straight and crooked lines; and by their frequent tendency to a horizontal direction. These striking peculiarities are exemplified in *fig.* 1635."

"Not unfrequently, however, the forms of the limbs and branches are entirely concealed by the exuberancy of foliage, as is the case in the Bounds Park Oak, and more particularly in that magnificent living canopy — *nulli penetrabilis astro*, impervious to the day, — the Chandos Oak, at Southgate, [see p. 1763.], which, although not exactly a painter's tree, is unquestionably unrivalled for regular beauty and plenitude of shade. The oak, also, is occasionally found to present an extremely graceful and pleasing figure, as is



1635

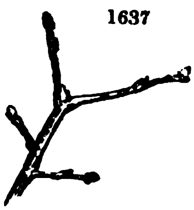
remarkably the case with the celebrated oak at Lord Cowper's [shown in *fig.* 1480. in p. 1741.]. This tree, above a century ago, was well known as the Great Oak at Panshanger. There is also a beautiful tree (*fig.* 1636.), of the same description, at Lord Darnley's seat at Cobham, which, being protected from the depredations of cattle, enjoys the most perfect freedom of growth, extending its latitude of boughs in every direction, and drooping its clustered foliage to the very ground." (*Strutt* in *Mag. Nat. Hist.*, vol. i. p. 42.)

1636

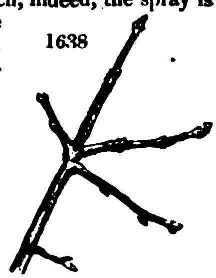


The Spray of the Oak has been described and illustrated by Gilpin, with his usual felicity. " In the spray of trees," he remarks, " nature seems to observe one simple principle; which is, that the mode of growth in the spray corresponds exactly with that of the larger branches, of which, indeed, the spray is the origin. Thus, the oak divides his boughs from the stem more horizontally than most other deciduous trees. The spray makes exactly, in miniature, the same appearance. It breaks out in right angles, or in angles that are nearly so, forming its shoots commonly in short lines [see *figs.* 1637. and 1638., from Gilpin; and *fig.* 1639., from Strutt]; the second year's shoot usually taking some direction contrary to that of the first. Thus the rudiments are laid of that abrupt mode of ramification, for which the oak is

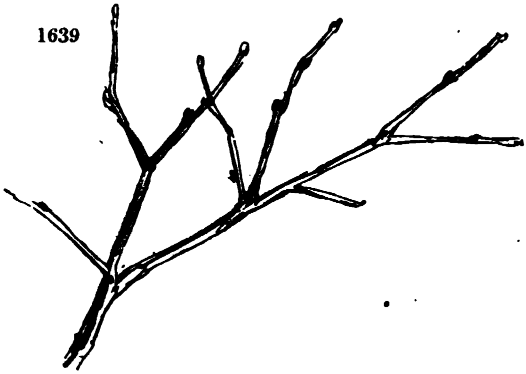
1637



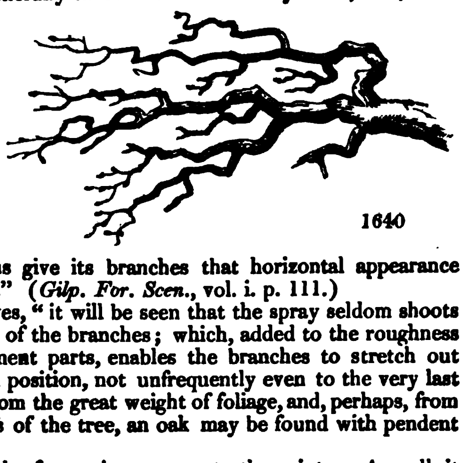
1638



1639



remarkable. [See *fig.* 1640., from Gilpin; and *fig.* 1641., from Strutt.] When two shoots spring from the same knot, they are commonly of unequal length; and one with large strides generally takes the head. Very often, also, three shoots, and sometimes four, spring from the same knot. Hence, the spray of the oak becomes thick, close, and interwoven; so that at a little distance it has a full rich appearance, and more of the picturesque roughness than we observe in the spray of any other tree. The spray of the oak also generally



1640

springs in such directions as give its branches that horizontal appearance which they generally assume." (*Gilp. For. Scen.*, vol. i. p. 111.)

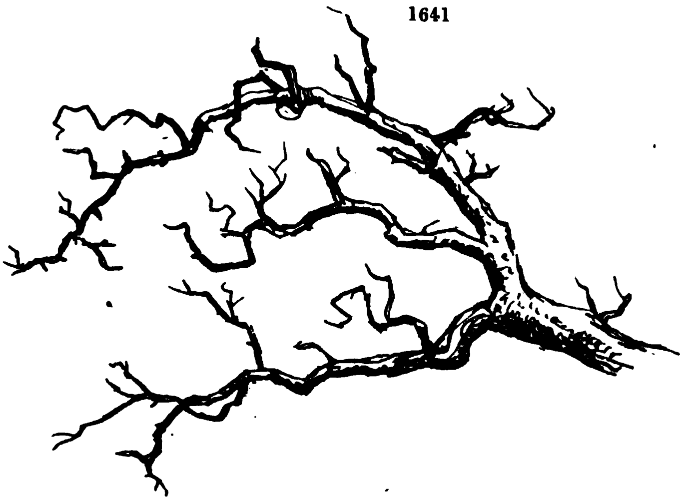
In *fig.* 1639., Strutt observes, " it will be seen that the spray seldom shoots from the lower or under side of the branches; which, added to the roughness and strength of their component parts, enables the branches to stretch out and maintain their horizontal position, not unfrequently even to the very last twig; although sometimes, from the great weight of foliage, and, perhaps, from some difference in the species of the tree, an oak may be found with pendent boughs.

" The ramification of trees is of great importance to the painter. As well, it has been observed by Gilpin (see p. 1790.), might an artist attempt to delineate the figure of a Hercules without expressing any of the muscles in his body, as to give the drawing of an oak tree without a scientific regard to the anatomy of its form, in a just display of the various angles and tortuous irregularities of its branches. The example shown in *fig.* 1641. is sketched from the denuded boughs, to give a more uninterrupted view of their peculiar character.

" The foliage of the oak is particularly suited to the pencil. In those portions which are brought nearer to the sight, the form of the individual leaves (*fig.* 1642. *a*) may here and there be expressed, as shown in the sketch, which also exhibits what is technically called the touch (*b*) necessary to express its character as it recedes from the eye.

" The colouring of the oak, and, indeed, of all natural objects connected with landscape, admits of so great a variety, that it is impossible to give any precise rules on the subject : a diligent attention to nature will alone, in this respect, avail; for, besides the ordinary varieties induced by change of season, from the tender and emerald hues of spring to the deeper bloom of summer, and the rich and glowing tints of autumn, an astonishing diversity of colour is

1641



effected by accidental circumstances, dependent on the different aspects of morning, noon, and evening; on sun and on shade; on the colours of the sky and the clouds; on the clearness or haziness of the atmosphere, and its consequent powers of refraction; on opposition of colour; on the situation of the spectator; and on many other contingencies, all independent of the local colour of the object, yet all strongly affecting it. It is impossible, therefore, I repeat, to give in any written description, with tolerable conciseness, sufficient instruction for selecting the colours necessary to depict objects so constantly

1642



varying in their hues. A few simple tints on the pallet, and an hour's study in the forest, will be more instructive than a volume of remarks. The attention and minuteness with which a lover of nature will examine a favourite object, and the truth with which he will consequently be enabled to describe it, are strongly evidenced in the following passage, extracted from Gilpin's *Forest Scenery*:—'I have often stood,' says Gilpin, 'with admiration before an old forest oak, examining the various tints which have enriched its furrowed stem. The genuine bark of an oak is of an ash colour, though it is difficult to distinguish any part of it from the mosses that overspread it; for no oak, I suppose, was ever without a greater or less proportion of these picturesque appendages. The lower parts, about the roots, are often possessed by that

green velvet moss, which, in a still greater degree, commonly occupies the bole of the beech, though the beauty and brilliancy of it lose much when in decay. As the trunk rises, you see the brimstone colour taking possession in patches. Of this there are two principal kinds; a smooth sort, which spreads like a scurf over the bark; and a rough sort, which hangs in little rich knots and fringes. I call it a brimstone hue, by way of general distinction; but it sometimes inclines to an olive, and sometimes to a light green. Intermixed with these mosses you often find a species almost perfectly white. Before I was acquainted with it, I have sometimes thought the tree whitewashed. Here and there, a touch of it gives a lustre to the trunk, and has its effect: yet, on the whole, it is a nuisance; for, as it generally begins to thrive when the other mosses begin to wither (as if the decaying bark were its proper nutriment), it is rarely accompanied with any of the more beautiful species of its kind; and, when thus unsupported, it always disgusts. This white moss, by the way, is esteemed a certain mark of age, and, when it prevails in any degree, is a clear indication that the vigour of the tree is declining. We find, also, another species of moss, of a dark brown colour, inclining nearly to black; another of an ashy colour; and another of a dingy yellow. We may observe, also, touches of red, and sometimes, but rarely, a bright yellow, which is like a gleam of sunshine; and in many trees you will see one species growing upon another, the knotted brimstone-coloured fringe clinging to a lighter species, or the black softening into red. All these excrescences, under whatever name distinguished, add a great richness to trees; and, when they are blended harmoniously, as is generally the case, the rough and furrowed trunk of an old oak, adorned with these pleasing appendages, is an object which will long detain the picturesque eye.' " (*Strutt* in *Mag. Nat. Hist.*, vol. i. p. 246.)

The beauty of oak foliage is universally allowed; but that of *Q.* sessiliflòra may be said to be most admired in single leaves, and that of the other species in tufts of leaves. The difference between the two species, in this respect, was first pointed out by the Rev. W. T. Bree. " The leaves of *Q.* pedunculàta," he says, " are of a dark deep green; and, though rather small (and small leaves combine better than large ones), they are numerous, and grow close to the spray, clustered together in dense masses, forming those lovely tufts, or rosettes, which constitute one of the characteristic beauties of oak foliage. When the wind blows gently, it partially turns up, and displays their glaucous under surfaces in harmonious contrast with the deeper tints of those above, and presents a study worthy of the pencil of Gainsborough. The leaves of *Q.* sessiliflòra, being of a large size, are fewer in number, and less thickly set; consequently they do not mass so well. One of the specific distinctions of *Q.* sessiliflòra is, that it bears its leaves on footstalks; and this circumstance gives to the foliage a loose and straggling appearance, and a want of depth and solidity, which greatly detract from its general effect. For the same reason it is that many of the fine American species of oak, beautiful as they are, must yield the palm, in point of foliage, to the monarch of our British forests, *Q.* pedunculàta." (*Gard. Mag.*, vol. xii. p. 534.)

Soil, &c. Oaks, according to Nichols, " flourish best, and grow the quickest, in a rich deep loamy soil; and I have found by experiments and general observations, for more than 30 years, that the wood of such trees is of the firmest and best texture, and I believe it will be so found in all the different species of trees that grow the fastest." He agrees with Buffon in ascribing this to the increased thickness of the annual layers of fast-growing trees, in comparison with those that grow slower. (*Obs.*, &c., p. 41.) Monteath, in his *Forester's Guide*, 2d edit., has " observed that the oak grows fastest, and makes the best hearted-timber, in strong good clay soils." In proof of this, he refers to oak trees on the estates of Alloa, Airthrey, and Alva, the two latter on the face of the Ochil Hills. The trees on these estates, he says, although " very rapid in growth," produce " most excellent timber. In a tree from 2 ft. to 3 ft. in diameter, there will not be above three quarters of an inch of white or sap wood; and in the very heart of the topmost branch

there is little or no white wood." (p. 365.) The oak, Sang observes, " will grow, and even become timber of considerable size, in soils of very opposite natures. It thrives best, however, in strong deep loam, incumbent on gravel or dry rock; but in all soils in which there is any considerable proportion of loam it will thrive in a greater or less degree. In low situations, where the soil is deep and moist, it grows rapidly, and attains a great size; but in such places it is found to decay sooner than it does in a more elevated situation, with a drier soil. In light soils of little depth, although it grows slowly, it becomes firm in texture; and the timber, though smaller in size, acquires a state of maturity sooner than that grown on more cool and retentive soils. In deep cool sand, it will root firmly, and arrive at a great size. In clay, incumbent on till, to which all other trees, except the beech and the sycamore have an aversion, the oak will grow and produce useful timber." (*Plant. Kal.*, p. 62.) Sir T. Dick Lauder, having quoted the above passage, adds, " Our own experience teaches us to corroborate Mr. Sang's opinion as to the variety of soil in which the oak may be seen to thrive. As one example, we find it growing vigorously on the banks of the river Findhorn, in every possible variety of soil, and equally well in soil superincumbent on the stratified and on the primitive rocks. It roots itself in the very face of the gneiss and granite precipices, whence it shoots forth, in the wildest and most picturesque forms, over the roaring rapids or deep abysses of the mountain stream; and every now and then we see that the slow but certain operation of the growth of its roots within the fissures of the rock detaches huge masses of it, and hurls them into the gulf below." (*Laud. Gilp.*, vol. i. p. 63.) " It is wonderful," says Evelyn, " to consider how strangely the oak will penetrate to come to a marly bottom; so as where we find this tree to prosper, the indication of a fruitful and excellent soil is certain, even by the token of this natural augury only. Thus, by the plantation of this tree and some others, we have the advantage of profit raised from the pregnancy, substance, and depth of our land; whilst by the grass and corn (whose roots are but a few inches deep) we have the benefit of the crust only." (*Hunt. Evel.*, p. 91.) In Hampshire, in that part of the New Forest called the Woodlands, wherever the oak tree clay, or yellow woodland clay, exists, its presence is more or less indicated by a spontaneous growth of oak wood. " In all such situations," Vancouver observes, " this timber may be cultivated to advantage; but, where the natural soil of the oak tree does not occur, it is as idle to attempt its cultivation, as to divert the laws of nature in any other respect." (*Agric. of Hamp.*, &c., p. 308.)

Situation. Upland situations are generally considered the best for oak to be grown in for ship-timber; and hedgerows better than close woods for the same purpose. The reasons, it is generally considered, notwithstanding the opinions of Nichols and Monteath, above given, are to be found in the comparatively slow growth of trees in dry soils fully exposed to the weather; and to the greater degree of perfection to which the timber of every tree must arrive, when its leaves are exposed to the influence of the sun and air on every side, and from the summit of the tree to its base. Oaks, says Pliny, grown in valleys are more stately, tall, and spreading, than those grown on mountains; but the timber of the latter is far better and finer-grained, and, consequently, more durable. Mitchell is of opinion that the best oak for ship-building is produced from a calcareous soil, in rather an upland situation, such as the Sussex chalk. (*Dend.*, p. 31.) Indeed, it is generally considered that the best oak timber in England is produced in the county of Sussex. (See p. 614.)

Propagation and Culture. The propagation and nursery culture of the oak have been already treated of in our introduction to the genus (p. 1727.). The after-culture of the common oak embraces the subjects of artificial shelter, pruning, thinning, training, &c. No specific mode of pruning is applicable to the oak; except that, where the object is ship timber of the crooked kind, the trunks ought not to be freed from branches for more than 12 ft. or 15 ft. in height, in order to throw strength into the larger limbs. It may also be advisable, in some instances, to stop the leading shoot for the same purpose. In general,

however, the oak, if planted in open situations, and if the stem be divested of its side shoots only to a moderate height, will produce a sufficient number of crooked arms and branches for every purpose in naval architecture. It is almost unnecessary to observe, that, when the object is ship-timber, and timber fit for making furniture, the acorns and plants of Q. pedunculàta should be chosen, in preference to those of Q. sessiliflòra.

Eligibility of the Oak for planting with a View to Profit, as compared with other Trees. The slow growth of the oak is by many alleged as a reason why plantations of it will prove less profitable than those of other trees. In answer to this it may be stated, 1st, that, as the oak is almost in every case planted among nurse trees, which are not cut down till they are of some value as poles or timber, there can hardly be said to be such a thing as a young oak plantation; and, 2dly, that though the oak, in ordinary circumstances, is of a slow growth while young, yet, after the trunk has attained a diameter of 6 in. or 8 in., the oak grows as fast as almost any other hard-wooded tree, and certainly faster than some; such as the beech and the hornbeam. The value of the timber of the oak, even when of small size, the value of the bark, and, as Matthew observes, the slight comparative injury of its shade to coppice-wood, hedge-plants, grass, corn, or other crops, "should give a preference to this tree for planting, wherever the climate and soil are suitable, over every other kind, with the exception of the larch and willow, which, in particular soils, will pay better."

For Hedgerow Timber, it is agreed by most writers that the oak is superior to all other trees. It produces the most valuable timber and bark in that situation, and does less injury to the hedge, and to the herbage or corn beneath it, than any other species, unless, perhaps, as Matthew observes, the apple and the pear be excepted; because the horizontal roots do not run near the surface, and the buds come later into leaf than those of any other British tree. The general form, and the great variety of outline, of the oak, as well as its colour, both in spring and autumn, also harmonise in a superior manner with the general scenery of an enclosed country. To be convinced of this, we have only to reflect on those parts of the country where larches, pines, and Lombardy and other poplars prevail in hedgerows, in which they are as bad in an agricultural, as they are in a picturesque, point of view. "The disadvantages," Matthew observes, "attending the planting of hedgerows with oaks are, that the removal of the oak, when young, is not in general so successful as that of other trees, especially in this exposed dry situation; also, that the progress of the plant, for a number of years, is but slow, and that it is thus for a longer time liable to injury from cattle. Fair success may, however, be commanded by previously preparing the roots, should the plants be of good size; transplanting them when the ground is neither too moist nor too dry; and, in autumn, as soon as the leaves have dropped or become brown, particularly in dry ground; performing the operation with the utmost care, so as not to fracture the roots, and to retain a considerable ball; opening pits of considerable size for their reception, much deeper than the roots; and should a little water lurk in the bottom of the pit, it will be highly beneficial, provided none stagnate so high as the roots; firming the earth well around the roots, after it is carefully shaken in among the fibres; and, especially, keeping the surface of the ground, within 4 ft. of the plant, friable and free from weeds, by repeated hoeings during the first two or three summers. Of course, if the plant is suffered to waver with the wind, or to be rubbed and bruised by cattle, or by the appendages of the plough, it is folly to expect success. On this account, stout plants, from 8 ft. to 12 ft. high, the branches of which are more out of the way of injury, may, in sheltered situations, under careful management, be of the most proper size. Much also depends on procuring strong plants from exposed situations. We have," continues Matthew, "experienced better success with hardy plants from the exposed side of a hill, having unfibred *carrot* roots, much injured by removal, than with others from a sheltered morass, having the roots most numerously fibred, and well extri-

cated." (*Matthew on Naval Timber*, p. 38.) The experience of Mr. Matthew agrees with that of Mr. Webster (*Gard. Mag.*, vol. xii. p. 368.), and is, indeed, consonant to reason. Several planters of experience have stated to us, that they have found oaks of ten or twelve years' growth, taken up without any preparation, and the heads closely cut in when transplanted, succeed much better than oaks one, two, or three years from the seed bed, or even smaller transplanted trees, in the same soil and situation. Alexander Milne, Esq., one of the Commissioners of Woods and Forests, informs us that this was the case several years ago, when a number of oaks, from 15 ft. to 20 ft. in height, were thinned out of a government plantation in the Forest of Dean, closely cut in at root and top, and planted in the open common or forest, being only guarded from cattle by a few thorn bushes tied round their stems. The late Sir Uvedale Price was equally successful in transplanting oaks in this manner, at Foxley.

Artificial Shelter, it is allowed by almost all writers on the culture of the oak, is essentially necessary to insure the rapid progress of a young plantation. This arises from the natural tenderness of the young shoots and early leaves of the oak, which, even in the south of England, are frequently destroyed or much injured by frost in May; while, in elevated situations, it is found that even the bark does not so easily separate from the wood of standing trees after a cold night. Modern planters seem to be all agreed, that the best mode of producing shelter for the oak is, by first covering the surface with Scotch pine, larch, or birch; the first being greatly preferred. After the nurse trees have grown to the height of 4 ft. or 5 ft., openings should be cut in the plantations thus formed, at the rate of from 300 to 500 according to some, and of 60 to 100 according to others, to the acre; and in each of these openings an acorn, or an oak plant should be inserted, the soil having been duly prepared. This practice seems to have originated at Welbeck, in Nottinghamshire, in the plantations made by the Duke of Portland, and to have been first described by Speechly in Hunter's edition of Evelyn's *Sylva*; but it has since been recommended by Pontey, in his *Profitable Planter* (4th. ed., p. 213.); by Sang, in his edition of Nicol's *Planter's Kalendar* (p. 294.); by Billington, in his *Series of Facts*, &c.; by Cruickshanks, in his *Practical Planter*; by Davis, in communications to the Bath and West of England Society; and by various others. It has also been extensively employed in the government plantations in the New Forest, Hampshire, under the care of Mr. Robert Turner, who, in 1819, was deputy surveyor of the New Forest; and to whom the merit is due of having first applied this method systematically, and shown the superiority of the Scotch pine, as a nurse plant for the oak, to all other trees. The poplar is universally rejected as a nurse for the oak, on account of the rapidity of its growth, and the very short period that elapses before it fills both soil and subsoil with its roots; and either covers the surface with its branches, or, if these are pruned off, raises its head to such a great height, that no plant of slower growth than itself can thrive near it. The elm, from the rapidity of its growth, is almost as objectionable as the poplar; and the same may be said of the willow. The pine and fir tribe supplies by far the best nurses for the oak, and, indeed, for all other hard-wooded timber trees; not only producing the most effective shelter, but the most profit when cut down. The Scotch pine and the spruce fir are preferable to any other pines or firs, and to the larch, because they are hardier, and grow more erect; whereas the pinaster and the maritime pine, though they will both stand the sea breeze, and the larch, though it grows with great rapidity even on barren soils and on mountains, almost always lean over to one side.

Speechly, in the extensive oak plantations made for the Duke of Portland in Nottinghamshire, on the exposed hills of what was formerly Sherwood Forest, found the birch the most suitable tree for shelter; chiefly, we believe, because it springs up every where naturally in that part of the country, and seems to thrive in the light sandy surface soil there better than any other tree. Mr. Speechly also found that sowing the poorer parts of the hills with furze was

a very effective mode of sheltering the oak; for though, he says, "it seems to choke and overgrow the oaks for some time, yet after a few years we commonly find the best oak plants in the strongest beds of furze." (*Hunt. Evel.*, p. 93., note.) Marshall prefers broom to the furze, as, being less disagreeable to work among. In the Welbeck plantations, the Scotch pine, and several sorts of fir trees, were tried, as well as the birch and the furze; but in that soil and situation they did not grow so fast as the birch; and, being evergreen, the young oaks did not thrive under them so well as they did under the deciduous trees. Mr. Speechly observes that he found that the seedling oaks were not injured, but rather improved, by tall grass and large weeds growing among them; which seems contrary to the nature of plants, and is certainly a practice that ought not to be generally followed, since these tall weeds and grass must prevent the sun and air from producing their full influence on the leaves of the seedling oaks. In this, as in similar cases, it may be laid down as a principle, that, in all cultivation, every step in the process ought to be regulated according to art and design, and nothing whatever, or, at least, as little as possible, left to unassisted nature.

Pontey advises planting only 300 oaks on every statute acre, by which the plants would stand at 12 ft. apart every way. He plants in rows, somewhat irregular, at 4 ft. apart; every third plant, in each row, being an oak, and the others being larches, spruces, and Scotch pines; giving the preference to the larch.

Sang first plants the ground all over with larches, at 3 ft. or 3 ft. 6 in. apart. After these have grown 2, 3, 4, or even 5 years, pits are formed from 4 ft. to 7 ft. apart, in which acorns are inserted. (*Plant. Kal.*, p. 195.) In this case, the object is to produce an oak copse; which, however, if thought desirable, may at any future period be so thinned out as to produce an oak wood.

Billington and Cruickshank proceed on the same principles as these planters; that is, they provide the shelter previously to planting the trees. All these writers agree in thinning out the sheltering trees gradually, and in regulating the number of oaks which are to stand on the acre by the fitness of the soil to produce oaks, and by the relative value of oak copse and the wood of larches and firs in a young state. Billington defers the thinning out of his nurses as long as possible; preventing them from whipping or shading the young oaks, by shortening the side branches of the nurse trees which protrude towards them.

Cruickshank's "new method of rearing the oak" differs in nothing of importance from that recommended by Mr. Sang; as, indeed, the author acknowledges (p. 209., note). He directs the ground to be first "well filled with Scotch pines or larches;" and, after these have risen to the height of about 4 ft. from the ground, which, in Aberdeenshire, he says, will require from 4 to 7 years, he digs patches on which to sow acorns, at the rate of 400 patches to a statute acre; the object being, of course, an oak copse, similar to that of Mr. Sang, at least in the first instance. The patches are prepared by digging and manuring with lime; and each is planted with 5 acorns, one in the centre, and four around it. After 2 years' growth, all the plants are removed but one, by cutting through their roots, 2 in. or 3 in. below the ground, with a sharp chisel-like instrument with a long handle, made on purpose; the plants removed not being intended to be replanted. As soon as the nurses overshadow the oaks, the plants that do so, or their branches, are to be removed; but "all the Scotch pines and larches that will require to be taken out before they are 16 years old," this writer says, "will not render the plantation thinner than a thriving one of the same kind of trees would, for its own sake, need to be at 20 years after planting." (p. 234.) When the oaks are 5 years old, they are to be pruned for the first time, by cutting off the lower tier of branches close to the stem; and this operation is to be repeated every 2 years, till the oaks are between 30 and 40 years old. Two thousand of the Scotch pines and larches," Cruickshank adds, "may be allowed to remain, not only without injury, but with advantage, to the oaks, till they are 16 years

old." Half of them may then be cut down, one half of the remaining 1000 at 25 years old, and the remaining 500 at from 30 to 35 years old. "To plant nurses, therefore, is attended with very great pecuniary advantage. It will not only return the whole expense laid out in making the plantation, but produce a very high rent for the land during the first 30 or 35 years; whereas, if oaks alone were planted, nothing could be gained during this period, except by cutting them down when between 20 and 25 years old, for the sake of their bark." (*Pract. Plant.*, p. 225.) The most valuable part of this writer's observations is what relates to the nature of the benefit to be derived from the nurses in such a climate as that of Aberdeenshire; which is, by preventing the first rays of the sun from suddenly thawing the frosts which have fallen perpendicularly on the young oaks. "The deleterious effects of spring and autumnal frosts arise chiefly from the leaves being subjected to a sudden change of temperature, from the chills of the night to the strong rays of the morning sun. When the thaw takes place gradually, the injury done is comparatively insignificant." (p. 222.) "If we wish, then, to preserve oaks from frost, we can do nothing better than to shade them from the morning sun. This we cannot do more effectually than by planting them, as above directed, among trees that have already made some progress. By such management the rays of the sun will not touch them till it has risen to a considerable height above the horizon; and thus time will be allowed for the frost to dissipate, and the night dews to evaporate, by a slow and gradual process; so that the pernicious consequences arising to the young oaks from a sudden change of temperature will be entirely prevented. It is not too much to say that a plantation of young oaks, thus sheltered from the outset, will make more progress in 5, than an unsheltered one will do in 10, years." These observations may be considered as principally applicable to cold districts, whether from elevation or latitude; but they are also judicious even with reference to plantations in the comparatively warm climate of the south of England, as is evident by the practice of sheltering with Scotch pines in the plantations made in the New Forest, where the oak is indigenous, and where the soil is particularly well adapted to it.

Cobbett would plant oaks in rows 25 ft. apart, and 25 ft. apart in the row; placing the plants of one row opposite the middle of the intervals between the plants in the next row. Then, he says, "I would have four rows of hazel at 5 ft. apart, and at 5 ft. apart in the row, between every two rows of oaks; and four hazel plants between every two oaks in the row itself. The hazel would rather, perhaps, outgrow the oaks; but it would shelter them at the same time; and where the hazel interfered too much with the oaks, it might be cut away with the hook. By the time that the hazel coppices were fit to cut for the first time, the oaks would have attained a considerable height; perhaps 8 ft. or 10 ft. This would give them the mastership of the hazel; and, after the second cutting of the hazel, there would begin to be an oak wood, with a hazel coppice beneath; and in the meanwhile the coppice would have produced very nearly as much as it would have produced if there had been no oaks growing among it. By the time that four cuttings of the hazel would have taken place, the coppice would be completely subdued by the oaks. It would produce no more hoops or hurdles; but then the oaks would be ready to afford a profit." (*Woodlands*, p. 434.)

Mr. Yates, a planter who received a premium from the Society of Arts, having fixed on a proper soil and situation for a plantation of oaks, trenches strips of 3 ft. in width, and 30 ft. apart centre from centre, from 3 ft. to 6 ft. in depth; it being his opinion that the oak derives its chief nutriment and strength from the taproot. The intermediate space between the trenches may either be employed for the growth of sheltering trees, pines or firs, or for hazel, or other underwood, or kept in grass. A row of acorns, 2 in. apart, is dibbled in along the centre of each trench; the plants produced by which are thinned out in the autumn of the year in which they come up, and every year afterwards, till they stand at 30 ft. apart. Pruning goes on every year, by removing, "close to the

main stem, one year's growth of side branches, till the plants are arrived at a stem of 40 ft., 50 ft., or 60 ft.; and they may then be permitted to run to head without further pruning." The thinnings, till the plants attain the height of 5 ft. or 6 ft., may be used for transplanting; after that they may be sold for walkingsticks, hoops, or crate-ware; at the next thinning, they may be cut down in spring, and barked, and sold as poles and for fence-wood; and, lastly, they may be cut down in spring, and barked, and sold as small timber for making posts and rails, for gates, and for various country purposes.

As the Ultimatum on the Subject of planting and sheltering Oaks, we give the following abstract of the practice adopted by the government officers in the national forests, and more especially in the New Forest, where, as we have already observed, it was introduced by Mr. Turner. This abstract was prepared by Alexander Milne, Esq., in answer to a question by Lord Hatherton, who intended to plant oaks extensively, as to the best mode of proceeding; and a copy of it was kindly presented to us by Mr. Milne: — "When the new plantations in the royal forests (now exceeding 40,000 acres) were first undertaken, the opinions of the most extensive owners and growers of oak timber, and of the most experienced nurserymen in various parts of the kingdom, were resorted to, as to the most advisable methods of planting, and especially as to the expediency of mixing Scotch pines in plantations the ultimate object of which was oak; and it is rather extraordinary, that the majority of the opinions received were against such mixture. Accordingly, in the most favourable soils and situations, oaks only were planted at first: but in spots where it was thought doubtful if oaks would grow, Scotch pines were planted with a small proportion of oaks intermixed; and it was soon found that in many of those spots, even under the disadvantages of inferior soil and greater exposure, such was the benefit derived from the warmth and shelter of the pines, that the oaks far outgrew their neighbours planted in more favourable soils, but without the same protection. After this, the use of Scotch pines became more general: strong belts were planted on the most exposed outsides of the plantations, and also across, at intervals, in lines, towards the most prevailing winds, and from these great benefit was found; but in all cases where oaks were planted actually amongst the pines, and surrounded by them, the oaks were found to be much the best. The plan next pursued was to plant an equal quantity of oaks and pines, planting both at the same time: the consequence of which was, that the pines got on immediately, but the oaks remained stationary for a few years, until the pines got sufficiently advanced to afford them shelter; and, in the intermediate time, a portion of the oaks died, and some were choked by the high grass, briars, &c., with which they might happen to be surrounded. For several years past, the plan pursued has been, to plant the enclosures with Scotch pines only, as soon as they are fenced in and drained (if draining is required); and when the pines have got to the height of 5 ft. or 6 ft., which they will do in as many years, then to put in good strong oak plants of about 4 or 5 years' growth, among the pines, not cutting away any pines at first, unless they happen to be so strong and thick as to overshadow the oaks. In about 2 years it becomes necessary to shred the branches of the pines, to give light and air to the oaks; and, in about 2 or 3 more years to begin gradually to remove the pines altogether, taking out a certain number each year, so that, at the end of 20 or 25 years, not a single Scotch pine shall be left; although, for the first 10 or 12 years, the plantation may have appeared to contain nothing else but pines. The advantage of this mode of planting has been found to be, that the pines dry and ameliorate the soil, destroying the coarse grass and brambles which frequently choke and injure oaks; and that no mending over is necessary, as scarcely an oak so planted is found to fail. It is not an expensive method of planting, especially if the plants are raised on the spot. The pines are planted by raising the turf with a Scotch planting spade. [See Part IV.] A man and boy may plant 500 in a day. For the oaks, good-sized holes must be made, and the making of these will cost from 1*s.* to 1*s.* 6*d.* a hundred, according to the soil.—*Office of*

Woods, &c., Dec. 1836." (See also the *Bath Society's Papers*, vol. xv. p. 41—67.; and an article entitled "*Minutes on the Method adopted by Mr. Robert Turner of raising Oaks, &c.*," by T. Davis of Warminster, and G. Sturge of Bristol, in the 13th volume of the *Gardener's Magazine.*)

Whether Oak Plants or Acorns ought to be used in forming Oak Plantations is a question, respecting the answer to which planters are not fully agreed; though, upon the whole, we believe, plants are preferred. A doubt, it is probable, would never have been raised on the subject, had it not been found that, under ordinary circumstances, the oak suffers more by transplanting than the elm, the ash, the beech, and other similar trees; which is partly owing to its natural delicacy, and partly to its depending, when young, chiefly on its taproot, and from its not producing, for some years, many lateral roots, unless forced to do so by art. When, however, the oak has been two or three times transplanted in the nursery before its final removal, it will produce a sufficient number of lateral roots to insure its growth, if carefully removed; and, for this reason, we should, in almost every case, prefer using strong transplanted plants to acorns. We have already remarked that oaks, after they have attained a certain size, are more successfully transplanted than seedlings of one or two years; a fact which will be found to hold good with all trees whatever which have taproots of extraordinary dimensions when young. One reason which some give for preferring acorns is, the alleged injury which oak plants sustain by the loss of the taproot, which, it is said, they never regain. This opinion, however, is well known to be erroneous; it being as natural, in the case of seedling oaks, for that part of the plant which is under ground to reproduce a leading or tap root when that has been cut off, as it is for the part above ground to reproduce a leading shoot after that has been removed. It is also equally well known, that the taproot is only found, in oak and other trees, when in a young state; and that no oak or other tree, when cut down, was ever found to have anything like a perpendicularly descending main root in any way comparable to the perpendicularly ascending trunk of the tree above ground. The consequence of sowing an acorn where it is to remain, and not cutting through the taproot, is, that it remains a longer period before putting out any lateral roots; but whether these lateral roots are put out sooner or later, can have very little influence on the growth of the tree under ordinary circumstances, and certainly none on the value of the timber which it produces. It is easy to conceive that, if the surface soil on which an acorn is planted is much richer than the subsoil, something in rapidity of growth will be gained by cutting off the taproot, so as to force the plant to send out lateral roots sooner than it otherwise would do; but, though something is gained by this, something, also, will be lost; because the supply of water, so essential to all plants which have naturally taproots, in a very young state, will be considerably diminished. In warm climates, therefore, and in all cases where a saving of first cost is an object, we should prefer acorns to plants; but in tolerably moist climates, and in deep alluvial or marly soils, or where the surface soil is rich, and where the object is to produce oak trees as soon as possible, we should recommend strong plants.

The following judicious observations on the subject of the taproot were communicated to the Bath and West of England Society by a planter and manager of timber of very great experience, Thomas Davis, Esq., of Portway, near Warminster. The taproots of young oak trees, Mr. Davis says, support the trees during a given period, which may vary in the number of years from various circumstances, soil, situation, &c., but is limited in effect by the necessities of the plant; and so soon as as the lateral roots take firm hold of the land, and are enabled to undertake the duty of support, from that time the taproot ceases to be useful, and at no distant subsequent period ceases to increase, and is very soon not distinguishable from the other roots. Mr. Davis therefore concludes,—"1st, That an oak seedling, or sapling, from 3 to 5 years old, planted out with the taproot cut off, will again root downwards; sometimes singly, sometimes forked. 2dly, That the practice of cutting off the

taproot gives the plant new vigour, and enables it, after a few years, to exceed in growth the native tree. And, 3dly, That large oak trees, whether native or transplanted, do, long before they become fit for naval purposes (I may say before they are proper for carpenter's uses), lose their taproots altogether. In short, I would contend that all small oak trees have taproots, and all large oaks have no taproots. I must, of course, be understood to speak in general terms." (*Bath Soc. Papers*, vol. xv. p. 51.)

Sowing the Acorns where the Plants are finally to remain. Several writers recommend sowing acorns broadcast, and along with them hazel nuts, haws, &c., and allowing the whole to grow up together. The undergrowths, in this case, shelter the young oaks during the requisite period; after which they cease to increase in height, and are by degrees gradually choked and destroyed by the shade of the oaks. This, however, is merely growing oaks among weeds of a larger and more permanent kind, and cannot be recommended as a scientific mode of raising oak woods, or woods of any other kind; though it may be advisable to resort to it under circumstances where plantations of any kind are better than none, and where there may be capital enough for procuring the seeds, and committing them to the soil, though not enough for doing so in a proper manner. This mode was also recommended by Sir Uvedale Price, because, if no more oaks were sown than can stand on the ground as full-grown trees, no thinning or future care of the plantation will ever be required by the planter. With a view to picturesque effect, such a mode is judicious; but it is not so when either rapid growth or profit is the main object.

Nichols, writing in 1793, says he finds by experience that bushes of white and black thorns, holly, and brambles, are the best nurses and protectors of young timber trees, especially oaks. He, therefore, invented a dibble, which will be found described in the *Encyclopædia of Arboriculture*, in the chapter on implements for dibbling acorns and other seeds into the heart of bushes, and among underwood. He planted many acorns with this instrument, he says, with the greatest success; and he strongly recommends this mode as better than any other for raising oak woods in the New Forest. (*Methods*, &c., p. 64.)

Marshall gives directions for raising oak woods; "oak," as he justly observes, "being the only tree admissible in a wood, because no other tree will allow copse to grow under it on land sufficiently sound and sufficiently level to be cultivated conveniently with the common plough." (*Planting and Rur. Or.*, 2d ed., p. 128.) He prepares the ground by a naked or a turnip fallow, as for wheat. At the proper season, he sows over the whole surface of the future wood with corn or pulse broadcast, but rather thinner than usual. The acorns he sows in drills across the lands, with intervening drills of temporary trees and shrubs, to be removed as they advance in size, so as ultimately to leave the oak trees 33 ft. apart every way. The details of this mode, being applicable to the chestnut and other trees, as well as the oak, will be given in the *Encyclopædia of Arboriculture*.

To raise a grove of oaks, Marshall proposes to sow drills of acorns alternately with ash keys, treating the plants produced by the latter as undergrowths, till the oaks have attained a sufficient size, when the ash trees are to be grubbed up.

Billington's opinion on this subject is decidedly in favour of using plants rather than acorns. He says, the raising of oak woods from sowing the acorn in the place it is to remain till the tree comes to maturity has been a favourite theory with speculative men for ages. The plan has been tried upon an extensive scale in the Forest of Dean, and in the New Forest in Hampshire, and in some other smaller forests belonging to government in different parts of the kingdom. As the experiment was made upon an extensive scale in these two principal forests, and was found impracticable, it may be useful to those persons who still think that the oak will make a tree sooner or better from the acorn than from a transplanted plant, to point out the reasons of the failure

of that method; and the probability, or rather certainty, of a transplanted oak making a tree as large or larger, and in less time, than a tree from the acorn sown or planted in the place where it is intended finally to remain. In the forests mentioned, the short-tailed, or field, mouse, the rooks, and various vermin, took the acorns out of the holes, and caused a great deficiency in the plants at first coming up; but the destructive ravages of that little animal the field mouse were not fully known till the third year from the commencement of planting the acorns. Great quantities of the small oak plants from the acorn were then found barked and bitten off, particularly where the grass was thick; and nearly all the ash that had been planted in the wet and moist grounds were barked all round the stem in the same manner as the oaks; only more so, as the mice seemed to be fonder of the ash than of the oak bark. The hares were first supposed to have done the mischief; but, on examining the plants more minutely, quantities of the excrement of the field mouse were found near every plant that had been barked or nibbled, except in the case of those plants which were not surrounded by grass or herbage of any kind. All such plants remained untouched by the mice; and the reason is, that, where the mice had not the shelter of grass and herbage, they were exposed to their natural enemies, the hawk, the owl, &c. Attempts were made to catch the mice by "cats, dogs, owls, poison, traps, baits," &c., but with very little success; till at length it was discovered by accident that, when a mouse had got into a hole in the ground with perpendicular sides, it could not get out again. In conquence of this discovery, holes about 18 in. deep, and somewhat wider at bottom than at top, were dug, at 20 yards apart each way, over a surface of about 3200 acres. "The holes were made from 18 in. to 2 ft. long, 16 in. or 18 in. deep, about 10 in., or the breadth of a spade, wide at the top, 14 in. or 15 in. wide at the bottom, and 3 in. or 4 in. longer at the bottom than the top: if the ground was firm, so much the better. Some holes were made in a circular form; but this was only a work of fancy, which cost more trouble than the oblong holes, as either sort answered, provided they were well made, the sides firm and even, and that they were 3 in. or 4 in. wider every way at the bottom than at the top; otherwise the mice would run up the sides, and get out again, if they could find any footing. But, if the holes were well made, when the mice were once in, they could not get out again; and, what is very extraordinary, they would really eat each other when left long in the holes." (*Facts*, &c., p. 42.) In wet or stormy nights, the mice got into the holes in the greatest numbers; but in calm, dry, or frosty nights, very few entered them. New holes were more attractive to the vermin than old ones. Baits of various kinds were put into them; but the baited holes were never found to contain more mice than the unbaited ones. Fifteen mice have been taken in a hole in one night. "Sometimes the holes were made in the bottoms of the drains, where there was not a constant run of water, as the mice appeared to run along the drains; and a great many were caught in these holes. The people who made the holes, of course, looked after the mice, and were paid for them by the dozen. They were obliged to attend to the holes to take the mice out very early in the mornings, otherwise the crows, magpies, hawks, owls, weasels, and other vermin, attended very regularly, and made the first seizure. Several of these depredators were caught in the fact, by the men dropping on them suddenly. We soon caught upwards of 30,000, that were paid for by number, as two persons were appointed to take an account of them, and see them buried or made away with, to prevent imposition." (p. 43.) Mr. Billington found oak trees cut down by the mice of 7 ft. and 8 ft. high, and 1½ in. in diameter at the place bitten off, which was just at the root, within the ground, and, as it were, between the root and the stem: in short, at what botanists call the collar. "When examining for the thick part of the root, below where it was bitten off," he says, "I never could find any part of it left; so that it is very probable it must have been eaten by them." (p. 45.) Mr. Billington also found the mice pretty numerous, and very troublesome, in the royal forest at Chopwell; more especially before the great snow in 1823, which destroyed many of them, and

no large oaks were bitten off for two years afterwards. From this relation of what occurred in a place where mice were so abundant, it does not appear to us that any general conclusion can be drawn against the use of acorns instead of plants; because, according to the same writer, the mice were equally effective in gnawing through trees 6 ft. or 8 ft. high, which, by a parity of reasoning, would afford an argument against the use of oak plants. The relation, however, is of great importance, as showing the numerous natural enemies of the seeds of trees, and also of young trees, which the cultivator requires to guard against. As neither the mice nor the other vermin mentioned are peculiar to the oak tree, we shall not here enter on the different modes of deterring vermin from injuring trees, or of destroying them, but refer our readers to this subject in the *Encyclopædia of Arboriculture*.

Pruning and Training. The common oak, in the nursery, will not bear severe pruning; nor is this of much use with a view to training the plant to a single stem, because, in almost every case of transplanting the oak to where it is finally to remain, it is found to make the clearest stem, and the most rapid progress, by cutting it down to the ground after it has been some years established. In plantations, or in single rows, the oak, even when a considerable tree, does not bear pruning and lopping so readily as the elm; but still it may be trained to a single stem, which should be of considerable height when the object is to produce plank timber; but short, when the object is to throw strength into the head, in order to produce crooked pieces for ship-building. These crooked pieces for ship timber are generally the result of accident; but there seems to be no reason why trees should not be trained by art to produce crooked stems, as well as straight ones. We are informed that, in the government plantations, in the Forest of Dean, there are some hundreds of acres of planted oaks, which have never been pruned in the slightest degree, that have perfectly clear trunks from 50 ft. to 60 ft. in height. These trees were planted thick, towards the end of the last century, and were gradually thinned out, as they advanced in size; and their side branches have died off, being suffocated by the surrounding trees. We shall notice here the modes which have been adopted or recommended for producing crooked, or what is called knee, timber, in the case of the oak; and, in our chapter on training trees generally, in our *Encyclopædia of Arboriculture*, we shall go into details.

Training the Oak for crooked, or Knee, Timber. Various schemes of training and pruning the oak, so as to produce crooked limbs of large dimensions, have been proposed by Marshall, Pontey, Billington, Matthew, and other writers. South, in the *Bath Society's Papers*, thus accounts for the production of crooked timber by natural means: — "Trees," he says, "dispersed over open commons and extensive wastes, have hitherto produced the choicest timber." Whoever traverses a woody waste, "with the eye of curiosity awake, must remark that almost every thorn becomes a nurse for a timber tree. Acorns, or beech mast, or sometimes both, dropped by birds or squirrels, vegetate freely under the shade and protection of the bushes, till they rise above the bite of cattle. Small groups and single trees are thus produced; their guardian thorns, when overpowered, perishing. Then the timber trees having open space for their roots to range in, their growth becomes rapid, their bodies bulky, their limbs large and extensive; cattle resort to them for shelter, enrich the ground with their droppings; and the timber, deriving advantage from the manure, becomes productive of knees, crooks, and compass pieces, the chief requisites in naval architecture." The French, this writer observes, have endeavoured to form kneed timber artificially, "by suspending weights to the heads of tender saplings, bowing them hastily to the ground; which is not only an expensive, but an inefficacious method; for it injures the plant, by straining the bark and rupturing the sap-vessels." (*Bath Soc. Papers*, vol. vi. p. 54.) Preferring the natural method of producing crooked timber, Mr. South continues,—"Parks and pleasure-grounds might be rendered enchantingly beautiful by being planted with clumps of quicksets, black thorns, hollies, &c., interspersed here and there, for the protection of acorns purposed to be sown

among them. Under their protection, oak saplings, which delight in sheltered places, would thrive exceedingly; be safe from the browzing of cattle, without the expense of fencing; and the lawns would become wooded with stately timber. When oaks are planted in groups, one or other often gains the mastery, or forces the rest to bend forward till they have room for ascent. Trees in groups, when few in number, enjoy a liberty nearly equal to single ones: each tree has a space where its roots may draw nutrition; and, as these and the branches usually follow the same direction, the leading roots of the exterior trees will tend outwards; and, finding nothing to obstruct their passage, will furnish supply sufficient to keep their trunks thriving, notwithstanding superiority of their antagonists. Hence it is manifest, that any quick-growing trees of small value may be used as instruments for forcing seedling oaks out of their upright line. Cuttings of coppice withy (*Sàlix càprea*) will, by the freedom of their growth, overpower the saplings, bearing them down almost to the ground for a time; and, the purpose being effected, may, for relief of the oaks, be cut down as often as requisite; till, as the oaks gain power, the withies, in their turn, give way. Plants like these, which extract nutrition of a different nature, though they promote a crook, will not starve or check the oaks beneath them. Trees growing out of a bank frequently take a favourable turn: such are accepted by the king's purveyors as compass pieces, which gain admission into the dockyards, though of less dimensions, and at a higher price than straighter timber. It may be proper, therefore, in new enclosures, to throw up the banks high and broad; to plant quicksets on the outer slopes, and on the tops withies; and, at due distances near the base of the inner slopes, to dib in acorns, which in their future growth must incline forwards, to avoid the projecting withies, and be some years before they can attempt a perpendicular growth. In such cases the crook will be near the but end, in the stoutest part of the timber, and the curve, thus formed in infancy, will retain its shape as long as the tree endures." (*Ibid.*, p. 59.)

Marshall has the following judicious observations on this subject: — "In forests and other wastes, whether public or appropriated, especially where the soil is of a deep clayey nature, oaks will rise spontaneously from seeds that happen to be dropped, if the seedling plants should be in situations where they are defended by underwood or rough bushes from the bite of pasturing animals; and some few of the plants thus fortuitously raised may chance to take the form desired by the ship carpenter; but this is all mere matter of accident. By freeing the stems of young trees from side shoots, and by keeping their leaders single, a length of stem is with certainty obtained; and, by afterwards checking their right growth, and throwing the main strength of the head into one principal bough (by checking, not removing, the rest), a crookedness of timber is with the same certainty produced; and, what is equally necessary in ship timber, a cleanness and evenness of contexture results at the same time. The dangerous, and too often, we fear, fatal, defect caused by the decayed trunks of dead stem boughs being overgrown and hidden under a shell of sound timber (a defect which every fortuitous tree is liable to) is, by this provident treatment, avoided: the timber, from the pith to the sap, becoming uniformly sound, and of equal strength and durability." (*Pl. and Rur. Or.*, vol. i. p. 141.)

Billington produced crooked timber, in His Majesty's wood at Chopwell, in Durham, by fastening oak trees, that were not too strong to be hurt in bending, to larch trees, and keeping them "in a bent position for about two years." He tied the oaks to the larches with twisted withs, tarred twine, or matting; but, as he does not inform us in what state the trees were eight or ten years after having been subjected to this operation, his experiment may be considered as having been only commenced. He gives directions, illustrated by woodcuts, for pruning off the smaller branches from the larger ones, so as to leave the head of the tree with only three or four large arms, instead of a multitude of branches; and this operation, if commenced in time, and the side branches cut off when not above 1 in. in diameter, promises to be of use. We have heard nothing of these trees since, finding, on enquiry at the Office of Woods

and Forests, that the plan was merely a scheme of Mr. Billington's, carried into execution on a limited scale, in the way of experiment.

Matthew says, "The easiest way to procure good oak knees is to look out in hedgerow and open forest for plants which divide into two or four leaders, from 5 ft. to 10 ft. above ground; and, should the leaders not diverge sufficiently, to train them as horizontally as possible for several feet, by rods stretching across the top, or by fixing them down by stakes." (*On Naval Timber*, &c., p. 26.)

That timber trees should be trained according to the kind of timber which it is desirable that they ought to produce, is as correct, as a general principle, as that the different kinds of fruit trees ought to be trained in a manner the most suitable for producing their respective kinds of fruit; but the subject of training forest trees is as yet in its infancy, and the circumstance that iron and other metals can be substituted for crooked pieces, as Mr. Snodgrass, Sir Robert Seppings, and others have shown, is at present rather against the progress of this department of the forester's art.

The Age at which Oak Timber ought to be felled, with a View to Profit, must depend on the soil and climate in which the tree is grown, as well as on other circumstances. Whenever the tree has arrived at that period of its growth, that the annual increase does not amount in value to the marketable interest of the money which, at the time, the tree would produce if cut down, then it would appear more profitable to cut it down than to let it stand. Perhaps it would not be difficult to construct a table, to show the proportion between the annual increase of the trunk at a certain distance from the ground, and the annual amount of timber added to the tree; and, the price of timber and bark being known, a calculation might thus readily be made of the total value of the tree, and the total value of the annual increase. We are not aware, however, that any such table has been calculated; but the idea of it may be useful to proprietors of trees, with a view to felling them. A writer in the *Gardener's Magazine* states that Mr. Larkin, an eminent purveyor of timber for ship-building, stated, when examined before the East India Shipping Committee, that, in situations the most favourable for ship timber (the Weald of Kent, for example), the most profitable time to cut oak was at 90 years old; as, though the largest scantlings were produced at 130 years' growth, the increase in the 40 additional years did not pay 2 per cent. (*Gard. Mag.*, vol. xi. p. 690.) In Lord Melville's *Letter to Spencer Perceval, Esq.*, when the latter was prime minister, he says that, "for naval purposes, oak trees require to be from 80 to 150 years of age, according to the quality of the soil in which they are grown." (*Letter*, &c., p. 3.) The Rev. W. T. Bree observes that, as the oak, like all other trees, varies exceedingly in its growth, according to soil and situation, &c., no one fixed period can be given for cutting it down, applicable to all, or even to the generality of cases. A practised eye, he says, will be able readily to decide when a tree is ripe for the axe. "There will no longer be any vigorous shoots in the extremities of the branches; but, instead of this, a curling or crinkling of the spray, with scarcely any perceptible growth: dead branches or small ones will occasionally be seen towards the top; and, above all, the bark will cease to expand, and, of course, will no longer exhibit those light red or yellow perpendicular streaks in its crevices, which are a certain proof of its expansion, and of the consequent growth of the wood beneath." As to the question at what age oaks should be cut down, so as to make the best return in point of profit, this will depend mainly on the demand for oak timber of this or that particular size and quality in each neighbourhood. (*Gard. Mag.*, vol. xi. p. 550.)

Felling the Oak for Timber. On account of the great value of oak bark, the operation of felling is generally performed in spring, when the sap is up, in order to admit of the bark being readily separated from the wood. It is commonly alleged, that felling, at this season, must be highly injurious to the timber; but, when it is considered that the sap ascends only in the soft, or outside, wood, and that it may be evaporated from it by sufficient exposure to the

atmosphere after the bark is removed, the injury to even the sap wood must be trifling if this evaporation is allowed to take place, and the hard wood can sustain no injury at all. It has also been recommended to bark oak trees before cutting them down, and to leave them standing for a year afterwards; but this can be attended with no other advantage than that of evaporating the sap from the outside wood more rapidly than would otherwise be the case; and this rapid evaporation is, in some seasons and situations, and especially in warm climates, apt to produce rents and clefts in the trunk and boughs of the trees. Nichols, who had great experience as a purveyor of oak timber for the navy, found that, by divesting trees, before they are fully seasoned, of their sappy coats, the exterior parts of the wood, or heart, by exposure to the air, suddenly contract, and shut up their pores, so as to prevent the escape of the internal juices: hence a fermentation soon begins, and rottenness is the certain consequence. This does not happen when timber is seasoned with its sap on; the outward parts of the wood not being then suddenly contracted, on accounted of being sheltered from the sun and wind by the coats of sap which surrouud it, and the juices freely evaporating through the spongy substance of the sap. (*Meth.*, &c., p. 45.) "Oak timber, cut into lengths, and sided (squared on the sides), soon after it is felled," he says, "and laid up in piles till wanted for use, is often found, in the dock-yards, very defective and rotten, particularly at the heart. The annual coats of wood of which trees are composed, and which encompass them like hoops, and hold them together, are in part cut off; and the juices flying off very quick, frequently cause them to split or crack, and the cracks or fissures receive the wet, which soon bring on rottenness." (*Ibid.*) "By long experience," he continues, "it is unequivocally proved, that the best way hitherto known of keeping or seasoning oak timber, previously to its being used in ship-building, is in a rough hewed state, with its sap on; not only on account of applying it, when wanted, to the most profitable uses, but by lying in the sap for two, three, or more years, it seasons gradually, and never splits or opens, as it frequently does when the sap is taken off, by siding or cornering it when green, and laying it in piles, and whereby it receives very considerable damage, and very often is entirely spoiled. This is never the case if it be suffered to season in the sap: for, though the sap is certain to perish and moulder away in a few years, let it be treated in whatever manner it may with a view to prevent its perishing, still the heart will be greatly improved by this mode of treatment, and, I believe, will endure many years longer for it; and certainly, when it is connected, it will have the great advantage of not twisting and flying about, as when worked green." (*Ibid.*, p. 43.) With respect to the practice of stripping oak trees standing, Mr. Nichols is clearly of opinion that it is of little or no use in rendering the sap wood as good as heart wood. He relates an instance of an oak which was stripped of its bark in the spring of 1784, and felled in the spring of 1788. "The tree," he says, "appeared, by the number of its annual coats, to have been 110 years old at the time of its being stripped; it contained 21 coats of sap, which were in a perishing state; so that the notion which some have entertained, that the sappy parts of oak trees become as hard or equal to the heart for strength and durability, by the operation of stripping them standing of their bark, and letting them remain till they die before they are felled, is chimerical." (p. 73.) "The Count de Buffon has incontestably proved, by his experiments, that, by stripping oak trees of their bark standing, and letting them remain till they die, before they are felled, the heart, or perfect wood, thereof will be considerably increased in strength and density; and it is also proved by experience, that the sappy part, or imperfect wood, will not be much altered thereby; at first, and while it is green, it will be found harder and stronger than the sap of trees felled in the usual way; but after a little time, and as the juices evaporate and fly off, it will perish and moulder away, as the sap of oak trees always will do, let them be treated in whatever manner they may with a view to prevent it. Every experienced ship-builder or carpenter well knows that wherever any

sap is worked with the heart of oak (as it sometimes is), it will ultimately tend to weaken and injure the building wherein it is used; for, however fair and well it may appear at first, it will most assuredly decay in a short time." (p. 75.) "For want of examining the original thickness of the sap [wood] of oak trees, and the progress of its decay, and from finding so much of young trees wasted by the decaying of their sappy coats (which generally occupy a considerable space, particularly if the trees were very vigorous at the time of their being felled), some have been led to imagine that, by trees lying for any length of time, the sap [wood] increases in its thickness, or that part of the heart is transformed into sap again, which is by no means the fact; and, if any part of the heart were subject to such change by so lying, there can be no reason assigned why, in the process of time, the whole should not undergo the like change: but this is absurd, and contradicted by experience; for, after the sappy parts are once formed into perfect wood, it ever remains in that state until it naturally decays." (p. 76.)

In felling oak trees the heads of which contain crooked pieces fit for particular purposes in ship-building, care should be taken either to cause the tree to fall on a side that will not injure the crooks, or to separate the branches containing these before cutting down the trunk. South mentions the Langley Oak, which was felled in 1758, in the New Forest, and which had a large head, full of knees and crooks. He thus describes the mode in which these were preserved: — "The knees and crooks were cut off, one by one, whilst the tree was standing, and lowered by tackles, to prevent their breaking. The two largest arms were sawed off at such distances from the bole as to make first-rate knees; scaffolds were then erected, and two pit-saws being braced together, the body was first cut across, half through, at the bottom, and then sawed down the middle, perpendicularly, between the two stumps of arms that had been left, at the end of one of which stood a perpendicular bough, bigger than most timber trees. To prevent this being injured, a bed was made of some hundreds of faggots, to catch it when it fell." (*Bath Society's Papers*, vol. vi. p. 8.)

Oak Copse is cut down at various periods between 15 and 30 years; the rule being, that the principal stems of the plants, at 1 ft. from the ground, should not be less than 6 in. in diameter. In favourable soils in the south and west of England, this size will be obtained in from 12 to 15 years; as, for example, at Moccas Court; but in the colder climate, and in the inferior soil, of the Highlands of Scotland, from 25 to 30 years are required. The cutting over of copse is performed at the same season as that in which full-grown trees are felled, when in both cases the bark is an object as well as the timber; but, in the cutting over of coppice trees, it is necessary to bear in mind, that the stools are intended to shoot up again, so as to produce another crop. To facilitate this, they require to be cut over smoothly, so as not to lodge water; and close to the ground, in order that the shoots for future branches may proceed at once from the roots, and not at some distance over them; in which case they would be liable to be blown off. (See the chapter on coppice wood, in the *Encyclopædia of Arboriculture*.)

Disbarking the Oak. The season for disbarking the oak for the tanner is later than that for disbarking the birch, the larch, the willow, or any other tree the bark of which is sufficiently valuable to be taken off. In most of the trees mentioned, the sap will be found sufficiently in motion towards the end of April: but the oak, relatively to these trees, will always be found a month later. As the mode of performing the operation, and managing the bark afterwards, till it is sold to the tanner, is the same in all trees, we shall defer giving it till we treat on the subject of arboriculture generally.

Accidents, Diseases, Insects, Epiphytes, &c. The British oak is not subject either to many accidents, or to many diseases; but, like every other plant, it has its parasitical and epiphytical vegetation; and it is infested by numerous insects.

Accidents. Oaks are said to be more frequently struck by lightning than

other trees, which Professor Burnet thinks may be owing to the imperfectly conducting power of the dense mass which composes the head of this tree; for, though pines and firs grow higher, yet they are of lighter forms, and their inferior conductibility, from the resinous nature of their wood, may in some measure protect them. Some very remarkable instances of oaks being struck by lightning are recorded in the *Philosophical Transactions* by Sir John Clark, who thus writes: — "Being lately in Cumberland, I there observed two curiosities in Winfield Park, belonging to the Earl of Thanet. The first was a huge oak, at least 60 ft. high, and 4 ft. in diameter, on which the last great thunder had made a very odd impression; for a piece was cut out of the tree, about 3 in. broad and 2 in. thick, in a straight line from top to bottom; and the second was, that, in another tree of the same height, the thunder had cut out a piece of the same breadth and thickness from top to bottom, in a spiral line; making three turns about the tree, and entering into the ground about 6 ft. deep." Professor Burnet saw, in July, 1828, the ruins of a very fine oak at Pinner, Middlesex, which had the whole of its arms severed from the trunk at their junction with it, and scattered on the ground. The trunk, which was about 10 ft. in girt, was completely stripped of its bark, and shivered from the summit to the root. Perpendicular clefts passed into the heart wood, and rent through the trunk in many places, so that splinters of 6 ft., 8 ft., or 10 ft. long, and 3 in. or 4 in. thick, might be pulled out; "one of which," adds the Professor, "I have." (*Amœn. Quer.*, fol. 9.) The same year, and in the same month, we observed, close by St. Albans, an oak tree by the road side, which had been struck by lightning the night before, and from the trunk of which a narrow strip of bark had been torn from the summit to the root; the trunk being not otherwise injured, though several branches were broken off. An oak in the New Forest "had nearly one quarter of the tree forced away from the body, and several of the massive limbs of the upper part driven from their sockets a distance of several feet." (*Brand's Journal.*) "It is not improbable," says Professor Burnet, "that the liability of the oak to be struck by lightning may have led to the dedication of that tree to the god of thunder."

Fig. 1643. represents an oak, growing in the parish of Weston, in Norfolk, which was struck by lightning on the 26th of September, 1828. The drawing was taken immediately after the accident, and represents correctly the damage sustained, as it appeared at that time: but since then the standing bough has fallen, and the tree is otherwise fast going to decay. Not the slightest portion of bark was left upon the trunk, although not a single bough was stripped, nor were the leaves torn off. The fissures reached from the top to the ground, but not in connexion; gradually decreasing downwards, except the lowest, which decreased upwards. Pieces of bark were thrown to the distance of 90 yards. This was one of six trees standing in a line, and not the tallest. In the summer of 1822, a fine oak was struck by lightning, which was growing on Scottow Common, in the same county; but which, so far from being killed, continued to grow and flourish till 1828, when it was felled, and proved to be a sound and good tree in most parts. This tree was large and wide-spreading, affording shade in summer, and shelter in the winter, to the stock turned out to pasture on the common; and, before it was injured by the lightning, often attracted attention from the number of animals which were collected under it, and which it covered. From the time of its being struck, however, not a head of cattle was ever seen near it; the animals not only refusing to avail themselves of its shade, but obviously avoiding the tree, as if it were disagreeable to them. The above facts were first communicated to the *Magazine of Natural History* (vol. ii.), by the Rev. T. W. Salmon of Weston Rectory, and have been since sent to us, for this work, by Mr. Girling of Hovingham, Norfolk.

The roots of the oak not being so liable to rot in the ground as those of the elm, the beech, and other trees, full-grown oaks are, consequently, not so liable to be blown down by high winds as the elm. The height of the oak being less

1643



in proportion to its breadth than that of most other trees, may be another reason why it offers a firmer resistance to storms. Notwithstanding this, terrible devastation has sometimes been effected among oak trees by the wind; and one of the most fearful instances occurred in October, 1831, when a destructive hurricane ravaged a considerable portion of the park of Thorndon Hall, the seat of Lord Petre, near Brentwood. The following account is abridged from that sent to the *Magazine of Natural History* by J.G. Strutt, Esq. :—"The blast came on about eight o'clock, and in less than four minutes the work of havoc was completed. The wind came from the south-west, and entered the park near the Lion's Lodge, where it threw down a small portion of the paling. It then traversed the park in a varying sweep of about 150 yards' breadth. Near the lodge, several oaks, 60 ft. high, were torn up by the roots, with adhering masses of earth, 14 ft. in length, and from 3 ft. to 4 ft. in thickness.

1644



The stems of many trees were torn off within a few feet of the ground; and others merely had the head or branches broken, without being entirely detached. (See *fig.* 1644.) Whole trunks, huge limbs and branches, with immense masses of earth, were mingled on the ground in such a manner as to give the idea of a battery of heavy artillery having been directed against the trees in that part of the park. In some instances the stems exhibited "the appearance of having been cut off, and in others they are rent from top to bottom, or have had their giant limbs twisted off, as if they had been but so many twigs." Lofty oaks were struck near their summits, and immense portions of their upper limbs and branches were torn down, but not quite severed from the trunk, and, with their heads resting on the ground, formed "a sort of tent of foliage upwards of 30 ft. high .... Several oaks had at least a dozen immense branches torn off, while the bare and desolate-looking trunk was left standing; and, in many instances, the limbs and branches of standing trees were twisted

and interlaced in a variety of fantastic shapes. More than 300 trees were torn up, or shattered so much as to render it necessary that their remains should be felled. This park, during the war, furnished some of the finest naval timber that could be procured in the kingdom." (*Mag. Nat. Hist.*, vol. vi. p. 107.) We have also received from Henry Lee Warner, Esq., of Tibberton Court, Herefordshire, an account of a hurricane which occurred there in December, 1833, which destroyed a magnificent oak standing on his lawn. This noble tree had a trunk 31 ft. high to the fork, where it divided into 12 large limbs, and 14 somewhat smaller branches; altogether forming an enormous head. The circumference of the trunk was 19 ft. 8 in. at 4 ft. from the ground, and 15 ft. 4 in. at the height of 26 ft. The tree was stag-headed, and appeared to have been for some time in a state of decay. After the tree had fallen, the roots, on examination, were found in a decayed state. "The trunk, or body, which, 20 years before, was perfectly upright, had been gradually losing its perpendicularity, inclining more and more to the south-east, till it got without the line of direction; and then with its immense head it fell by its own weight. It is a curious fact, that, although the greater part of the roots had perished, and the tree was stag-headed and the boughs without leaves, yet the body was perfectly sound. The boards and quarters which the sawyers cut from it are of the firmest and most beautiful texture.—*H. L. W.*"

Diseases. There are few or no diseases peculiar to the British oak. The honey dew, though very frequent on young oaks, is not peculiar to that tree. The punctures of certain insects, which produce galls and other excrescences, and which may be considered as diseases, will be hereafter mentioned.

Vermin and Insects of different Kinds which feed upon the Oak. The wild animals which live upon acorns, we have already observed (p. 1789.), are numerous; but those which are chiefly injurious to man are such as eat the acorns after they have been planted, or the young trees. The insects which live upon the oak are all more or less injurious to it; and these are very numerous.

Vermin. The most general enemy to planted acorns, and also to young oak trees, is the field mouse, an account of the ravages of which in the Forest of Dean has already been given (p. 1806.). The water rat is also believed to feed on the acorn, and the squirrel is known to depend principally on it for its winter provision. Neither of these two animals, however, are generally in sufficient numbers near nursery gardens, or extensive grounds about to be planted, to be productive of any serious injury; for the squirrel is never found at a distance from full-grown trees, nor the rat from the banks of rivers or streams. The mode of entrapping mice in the Forest of Dean has already been given, and other modes of catching these, and other animals considered as vermin relatively to trees, will be found in the *Encyclopædia of Arboriculture.*

Insects. The British oak, probably both on account of its large size, and the peculiar nature of its juices, is attacked by a far greater number of insect enemies than any of the other trees of this country. Many of these insects are, of course, confined to this tree, but many feed indiscriminately upon the beech, birch, and hazel, as well as upon the oak: thus, as it would seem, says Mr. Westwood, to whom we are indebted for this article, clearly proving, not only the very natural character of the order Amentàceæ, but also the equally natural distribution of the insects themselves into genera, consisting of species, all of which are either generally amentaceous in their food, or are confined to the oak or the birch alone. With respect to the number of species which are found upon the oak, we have the authority of Mr. Stephens (who must be considered as the most general practical collector of English insects) for stating that nearly half the phytophagous insects of England are either exclusively, or partially, inhabitants of the oak. Messrs. Kirby and Spence have given a calculation, from which they adduce the opinion, that the phytophagous and carnivorous insects are nearly equal in point of number of species; which would give about 2500 as half of the Phytóphaga: but to this

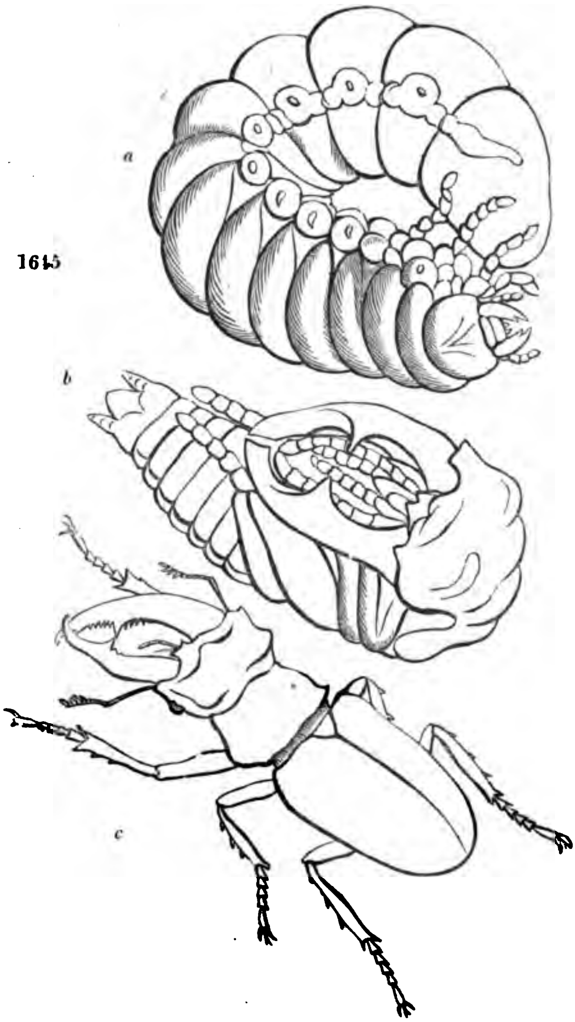
number, as inhabitants of the oak, must be added the vast quantities of *I*chneumónidæ, and other parasites, which feed upon the phytophagous species themselves. Perhaps the estimate here given may be found to be too great, although every one accustomed to collecting knows that the oak furnishes by far the greatest portion of his captures. Perhaps, if we give 2000 as the number of oak-feeders and their parasites, we shall scarcely run the risk of overrating the quantity. Lesser long ago said, "Le chêne suffit à en élever plusieurs centaines d'espèces différentes." (*Théologie des Insectes*, tom. i. p. 199.)

The solid Wood of the oak serves for the food of various insects, chiefly whilst in the larva state. Amongst these, the goat moth (Cóssus Lignipérda, p. 1386. fig. 1233.), the wood leopard moth (Zeuzèra æ'sculi, p. 887. and fig. 636.), the small stag beetle (*D*órcus parallelopípedus, p. 886. fig. 635.; *Gyll. Ins. Suec.*, i. p. 67.), and the Sinodéndron cylíndricum (p. 1225. fig. 1048.), are occasional inhabitants of the oak. Several other species of lamellicorn and longicorn beetles are also inhabitants of this tree: of these, the great stag beetle (*L*ucànus Cérvus, *fig.* 1645.) is the most abundant, as well as the largest. The larva of this insect (*a*) feeds upon the putrid wood of the oak. (*Gyllenhal Ins. Suec.*, i. p. 65.) It is a large, whitish, fleshy, grub, like that of the cockchafer (*M*elolóntha vulgàris); and it is furnished with three pairs of legs, attached to the three anterior segments. In general, it lies on one side, with the body curled up, so that the tail nearly touches the head. The structure of the jaws of this larva is very similar to that of the caterpillar of the Cóssus; although, in the perfect state, it is impossible to discover two insects more completely unlike each other. When it has attained its full size, it constructs a cocoon of chips of wood, agglutinated together, within which it assumes the pupa state, in which the immense mandibles of the imago are distinctly visible (*b*). The female pupa is, of course, destitute of these large jaws, these organs being but of comparatively small size in that sex when arrived at the perfect state (*c*). The beetle seems to subsist entirely upon fluids, which it laps up by means of its long pencil-like lower jaws and lip.

Tríchius variábilis is another lamellicorn beetle, the larva of which feeds upon the wood of the oak. It is occasionally found in Windsor Forest, but is of great rarity in this country. Its larva is very similar to that of the cockchafer. A beautiful figure of the perfect insect, which is also found upon, and within, the stumps of rotten oaks, is given by Curtis. (*Brit. Ent.*, pl. 286.)

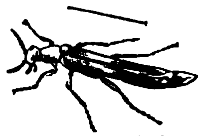
The larvæ of the longicorn beetles, on account of their generally large size, are destructive to trees; but they are comparatively of rare occurrence in this country, if we except the musk beetle, found in willows. In tropical climates, where the perfect insects attain a gigantic size, they must be as injurious as the Cóssus larva. These large wood-feeding larvæ, or some of them, at least (and it is not clearly proved which), were considered by the Romans as great dainties, and are still greedily devoured by the negroes in many tropical climates. We will not quarrel with the tastes of these Acridóphagi and Campóphagi, because there can be no reason why a larva, which feeds upon wood, should not be as nutritious as an oyster or a shrimp; but we will quote a short passage relative to the subject, from the observations of the celebrated African traveller, Smeathman:—"The larvæ of all the beetles that feed on decayed wood seem to be rich and delicate eating; so that every forest in the torrid zone affords a man plenty of very wholesome and hearty nourishment, who has an instrument strong enough to cut in pieces the decayed trees. This knowledge might have saved the lives, perhaps, of many seamen who have been shipwrecked on desert equinoctial shores, which are generally covered with thick woods. The very best kind of vegetable food is but poor nourishment for the labouring Europeans, if not accompanied with animal flesh, or, at least, with animal or vegetable oils; and such food as seamen in distress meet with, as above mentioned, have oftentimes very acrimonious qualities, and are dangerous, even in small quantities, to those who eat them

1645



at intervals; whilst these kinds of insect foods, abounding with a very rich and delicious oil, are, consequently, the most wholesome and nutritious which men in the situation above described could possibly procure; requiring no other preparation than roasting in any manner." (*Drury Introd.*, vol. iii.) Of these longicorn beetles, several British species inhabit the oak, especially Priònus coriàrius, which is the largest species found in this country, and of which the larva is not much smaller than that of the *Córssus*. The body is long, fleshy, and of a pale whitish colour; the head is rather small and flat; the anterior segments of the body the broadest, the remainder becoming gradually narrower to the tail; the legs are very minute; the body is not bent in the same manner as that of the larva of *Lucànus*. Clỳtus arcuàtus and Leptùra scutellàta are also found upon the oak, as well as several species of the coleopterous families Elatéridæ and Tíllidæ, including Aplotársus quércus and E'later

sanguíneus. In the *Magazine of Natural History* (iv. p. 265.), Mr. Dale states that he found the latter insect "in plenty, both in larva and pupa, on rotten oak stumps, in the New Forest. Tíllus unifasciàtus and ámbulans also feed, in the larva state, on the rotten oak; and the latter was captured and bred by Mr. Dale. (See *Mag. Nat. Hist.*, iv. p. 266.) But the most destructive insects to oak timber are the species of the family Lymexylónidæ, which, although common in Sweden and some other parts of the Continent, are, fortunately, of great rarity in this country. Lyméxylon dermestöìdes is about ½ in. in length, and is found in the trunks of the oak, and some other trees; whilst Lyméxylon nasàle *Fab.* (Cántharis navàlis *Linn.*, and our *fig.* 1646.) appears to be exclusively confined to oak timber, which it perforates, and completely destroys. (*Gyllenhal Ins. Suec.*, i. 317.) So great, indeed, was the injury caused in the royal dockyards of Sweden by this insect, that the greatest alarm was entertained for the safety of the shipping; nor did it subside until Linnæus, at the desire of the king of Sweden, had traced out the cause of the destruction; and had, having detected the lurking culprit under the form of the beetle above mentioned, by directing the timber to be immersed during the time of the metamorphosis of the insect and its season of oviposition, furnished a remedy which effectually secured the wood from its future attacks. (*Smith's Introduct. to Bot.*, pref., p. xv., quoted by *Kirby and Spence Intr.*, i. p. 237.; *Bechstein and Scharffenburg Forstins.*, vol. i.)

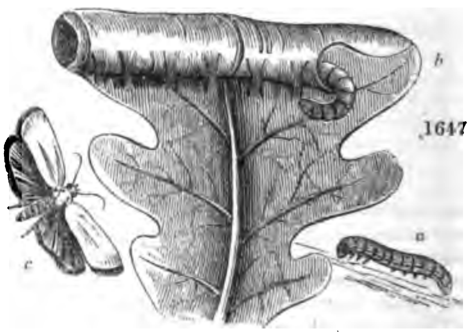


1646

Tínea ramélla *Lin.* feeds within the branches of the oak. (*Syst. Nat.*, ii. p. 887.)

Insects which live under the Bark. There are also many species of insects (chiefly small Coleóptera) which reside beneath the bark of the oak, without boring into the solid wood. Of these, the Scólytus pygmæ'us, already alluded to in p. 1390., as having recently caused the destruction of 50,000 young oaks in the Bois de Vincennes, near Paris, is the most redoubtable. (*Annales de la Soc. Entomol. de France*, 1836, p. xxx.) Tómicus villòsus, I'ps 4-guttàta, Hypùlus quércinus, Cerỳlon pilicórne, Rhyzóphagus díspar, Silvànus unidentàtus, and Bítoma crenàta, are also subcortical beetles, the first-named species being one of the typographer beetles. (See Pìnus.)

Insects which feed on the Leaves. It is, however, upon the leaves of the oak that the greatest proportion of its insect population finds its support; and it is chiefly amongst the caterpillars of lepidopterous insects that the greatest number of the leaf-feeders are found. Of these, the Tórtrix viridàna *Lin.* (*fig.* 1647.), a very small, pretty, green species, is by far the most obnoxious; entirely stripping the oaks of their foliage, as we have more than once observed at Coombe Wood, in Surrey. "Even the smaller sorts of caterpillars become, from their multiplicity, sometimes as destructive as those which are of considerable magnitude. During the summer of 1827, we were told that an extraordinary blight had suddenly destroyed the leaves of all the trees in the Oak of Honour Wood, Kent. On going thither, we found the report but little exaggerated; for, though it was in the leafy month of June, "there was scarcely a leaf to be seen on the oak trees, which constitute the greater portion of the wood. But we were rather surprised when we discovered, on examination, that this extensive destruction had been effected by one of the



1647

small solitary leaf-rollers (*Tórtrix viridàna Haworth*): for one of this sort seldom consumes more than four or five leaves, if so much, during its existence. The number, therefore, of these caterpillars must have been almost beyond conception; and that of the moths, the previous year, must also have been very great; for the mother moth only lays from 50 to 100 eggs, which are glued to an oak branch, and remain during the winter. It is remarkable, that, in this wood, during the two following summers, these caterpillars did not abound." (*Insect Transform.*, p. 203.) The moth (*c*) varies in the expansion of its wings from 7 to 13 lines: the anterior wings are pale green, with a whitish margin in front; and the posterior wings brownish. It is so extremely abundant, that, towards the end of the month of June, when it first appears, it may be shaken from the trees in perfect showers. The caterpillar (*a*) of this moth rolls up the oak leaves in a very ingenious manner, so as to form a very commodious retreat; in which, indeed, it ordinarily resides, the centre of the roll being open: its diameter is proportionable to that of the body of the insect; and the roll is secured by various little packets of silk attached to the body of the leaf, and to the adjoining part of the roll, as represented in *fig.* 1647. at *b*. Réaumur, in the second volume of his *Mémoires*, has given a very detailed account of the manœuvres employed by the caterpillars in the construction of these leafy rolls. These caterpillars were so numerous in Kensington Gardens in May and June, 1832, that "the excrementitious matter from them kept falling and tinkling on the grass below, so frequently as to give the idea of a sprinkling of rain being then falling." (*Mag. Nat. Hist.*, v. p. 671.) Millions of small lead-coloured caterpillars, tinted with green, and slightly hairy, were then some of them half an inch long, and depending on threads stretching to the length of 7 ft. or 8 ft. In some cases, a colony of fifty or a hundred of these insects appears to set off all at once from some point in a branch, and each to make the best of his way to the earth, the threads diverging into numerous different lengths, apparently according to the age and vigour of the caterpillar. At Haslemere, in 1830, 1831, and 1832, the ravages committed by this insect were so great, that whole woods of oaks were stripped of their leaves, and looked as if blighted by lightning. Each tree was "covered with the remains of skeleton leaves, curled up, and surrounded with a filmy web: its trunk and branches had a misty appearance, as if enveloped in white gauze; while here and there hung suspended a long web, or a caterpillar that had not yet found a habitation for itself in which to undergo its final change." (*Ibid.*, p. 670.) This insect is the same as that noticed in Brown's edition of *White's Selborne*, p. 311., in a note of the late Mr. Markwick. In the *Gardener's Magazine* for 1829 (vol. v. p. 610.), a writer, describing the ravages of this insect on the oak woods in Wales, says the coppices appeared to be all alive with them, so immense were the masses they formed. These insects, notwithstanding their numbers, appear, in their moth state, to have many enemies. White says that he saw a flight of swifts busily employed in "hawking them;" and, in the *Magazine of Natural History* (vol. v. p. 670.), it is stated that the *E'*mpis lívida, an insect of something less than their own size, fixes on them, "something in the manner that a stoat would on a hare or rabbit," and flies about with its victim, but never lets it go till it has destroyed it.

Amongst the Butterflies, Thècla quércus, or the purple hair-streak, is the only species which feeds upon the oak in the larva state: its caterpillar is small, and bears considerable resemblance to a woodlouse, being one of the onisciform larvæ. One which M. Lyonnet (*Recherch. sur l'Anat., &c., de differ. Espèces d'Insectes*, 2me part. pl. 36.) reared ceased to eat on the 1st of June; it then assumed a rounded form, and in three days arrived at the chrysalis state, without spinning any cocoon; and on the 27th of the same month the butterfly appeared. In its final state, it is an active elegant insect, sporting about the highest twigs of the oak. It is about 1½ in. in the expansion of the wings, which are of a bluish black on the upper side in the males; but in the females they are black, with a rich glossy blue disk. Owing to their smaller size, and more brilliant colouring, the females have been by

the majority of authors mistaken for individuals of the opposite sex; but Dr. Horsfield (*Lepid. Javanica*) detected the error, by carefully investigating the structure of the insects. In the sixth volume of the *Magazine of Natural History*, p. 227., are several notices of this insect. Mr. Conway observes that, in Monmouthshire, individuals of this species present a very beautiful sight, while sporting about the tops of the oaks just at sunset, the brilliant blue of their beautiful wings catching the light as they fly, and then the whole disappearing among the foliage. These insects are very pugnacious, and frequently destroy their beauty by pursuing each other through the trees. They are, however, easy of capture; for, when once they alight on the foliage, they may be approached closely without being disturbed. (*Ibid.*, p. 544.) Before appearing in their pupa state, they are said to retire into the earth. (*Ibid.*, p. 189.) A correspondent of the same magazine (vol. v. p. 67.), speaking on the planting of certain trees, as a means of attracting the insects and birds which feed on them, mentions that, having made some oak plantations near his dwelling, he was agreeably surprised to find near them Thècl*a* quércus, and Melitæ'*a* Euphrósyn*e*, pearl-bordered fritillary; insects which he had previously never seen within some miles of the spot.

In the following list, the lepidopterous insects marked thus * feed on other trees as well as upon the oak; and the lepidopterous insects marked thus † feed exclusively on the oak.

Amongst the Sph*í*ngidæ, the caterpillar of *Smerínthus tíliæ *Linn.*, or lime hawk-moth occasionally feeds upon the oak; but amongst the Linnæan *Bómbyces*, the number of oak-leaf feeding species is very considerable, including *Pygæ'ra bucéphala (the buff-tip moth), *Staúropus fàgi (which, from the singular form of its caterpillar, has been named the lobster-moth), *Lophópteryx *c*amelìna, the species of Chaònia *Steph.*, including †C. róboris, †dodonèa, and †quérnea, all of which feed exclusively upon the oak; *Petàsia cassínea (the sprawler), †Perídea serràta, *Satúrni*a* Pavònia (the emperor moth), and **S.* taú (the tau emperor), *Lasiocámpa quércus, and *róboris. †Cnethocámpa processiònea (or processionary moth) is a very interesting species, common in France and Germany, but not yet ascertained to be an inhabitant of this country. The larvæ construct a common temporary nest upon the branches of the oak, the situation of which they change from time to time, until they are about two thirds grown. They are hairy, and varied with grey and ashy brown stripes, and yellow spots on the back, and are nearly allied to the caterpillar so common upon fruit trees, the moths of which, from the striped appearance of the caterpillars, have been called lackey moths; some time before they attain their full size, they unite, and construct a general nest upon the trunk. "This nest, when completed, is about 1 ft. 6 in. long, 6 in. broad, and composed of a grey silk, resembling the surface of the tree; but the most curious fact in their history is, the extraordinary regularity with which the larvæ proceed, towards sunset, in search of food. At their head is a chief, by whose movements the procession appears regulated; and he is followed by three or four in a single line, the head of the second touching the tail of the first, &c. Then comes an equal series of pairs, next of threes, and so on as far as fifteen or twenty, forming a band several feet in length. Sometimes the order is rather different, the leader being followed by two, then three, and so on; but at all times the procession moves on with an even pace, each file treading upon the steps of those which precede it, through all the sinuosities made by the chief. They do not invariably return to their nest before morning, but may sometimes be found during the day assembled in irregular masses, heaped upon each other." (*Steph. Illust. Haust.*, ii. p. 47. note; *Réaumur Mémoires*, tom. ii. mém. 4., with 2 platès; *Nicholai Die Wander oder Prozessions Raupe*, &c. Berlin, 1833, 8vo.) According to Réaumur, it is dangerous to approach the nests of this insect, especially at the period of the moulting of the caterpillars, on account of the irritating effects of the hairs, which at that time float about in the atmosphere. Some ladies who accompanied Réaumur in his observations were much affected,

and found their necks full of troublesome tumours; whilst he himself suffered for several days from having handled them. In these respects, they are very similar to the celebrated *Pityocámpa* of the ancients, and which is the caterpillar of another species of this genus, which feeds upon the fir. *Pœcilocámpa pópuli, *Hypogýmna díspar (the gipsy moth), *Psilùra monàcha (the black arches), *Dasychìra fascelìna (the dark tussock), *Psỳche fúsca, and †Limacòdes *T*estùdo. Amongst the *Lithosiidæ*, *Callimórpha miniàta, *Lithòsia complàna (the common footman), *L. quàdra (the four-spotted footman), *Gnóphria rubricóllis.

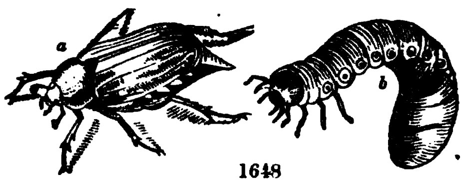
Amongst the Noctüidæ, * Semióphora góthica, † Orthòsia instábilis, *O. grácilis, *O. múnda, *O. crùda, *O. stábilis, *Glæ'a satellítia, †Amphípyra pyramídea, †Xýlina rhizólitha, *X. petrificàta, *Misèlia aprilìna (the beautiful marvel du jour moth), †Pòlia seladònia, *Apatèla áceris, †Díphthera Orìon, *D. ludífica (British ?) †Cerópacha dilùta, †C. rìdens, †Cymatóphora O'o, *Cósmia trapezìna, †Xánthia croceàgo, and †X. rufìna, †Catephìa leucómelas, *Catocàla fráxini (the great blue under-wing moth, similar to C. elocàta, p. 1484. fig. 1293., but 4 in. in expanse, and having the ground of the under wings blue instead of red), †Catocàla pácta, †C. spónsa, and †C. promíssa, three very beautiful, but small, species of this genus, with the ground colour of the under wings scarlet), and *Brèpha nòtha.

Amongst the Geométridæ are, † Anisópteryx leucopheària, *Hybérnia capreolària and *H. defoliària (which are occasionally very destructive in oak copses), * Phigàlia pilosària, * Bíston prodromàrius (the great oak beauty), * B. betulàrius (the peppered moth), * Hímera pennària, * Crocàlis elinguària, several species of thorn moths (several of which are figured in all their states, and in a most admirable manner, by M. Lyonnet, in his *Posthumous Memoirs*, recently published), including † Geómetra quercinària, † G. quercària, † G. angulària, *G. illunària, * G. illustrària, &c.; †Cleòra bajulària, Cleòra cinctària. (See *Mag. Nat. Hist.*, v. p. 265.) * A'lcis roborària, A'lcis consonària, and A. consortària (*Lyonnet Mém. Posth.*, pl. 29. f. 20—27.), † E'phyra punctària, * Eurýmene dolabrària. Amongst the *Platyptericidæ*, *Pyrálidæ*, *Tortrícidæ*, *Tineidæ*, and other remaining lepidopterous families, composed of insects of small size, a vast number of species are oak feeders, including * Drépana falcatària, †D. hámula, *Pechipògon barbàlis, *Hylóphila prasinàna (*Réaumur Mém.*, tom. ii. pl. 39. f. 13, 14.), * H. quercàna, †Lozotæ'nia roboràna, † Pseudotòmia atromargàna, * Roxàna arcuàna, † Phibalócera quercàna, † Phycìta roborélla, Adèla Geerélla (*Lyonnet Mém. Posth.*, pl. 19. f. 17—25.; *T*ínea sequèlla (*Id.*, pl. 19. f. 26.), the cocoon of which is an exceedingly interesting geometrical construction, described in detail by Lyonnet.

Amongst the Leaf-feeding Species, the majority are external feeders, neither concealing themselves in cases, nor rolling themselves up in leaves; but some, especially amongst the smaller species, do not agree with these in their habits, and adopt various methods of defence, which render an examination of the different inhabitants of this tree an object of the greatest interest. Of these some roll up several leaves into a ball of considerable size (*Réaum. Mém.*, tom. i. pl. 15. f. 3., and pl. 32. f. 4, 5.), which latter represents the habitations of the scarlet under-wing moths above mentioned; others, again, construct their boat-shaped cocoons of strips of oak leaves (*Ibid.*, pl. 38. fig. 7.); others, again, roll up the leaves in various directions (as *T*órtrix viridàna, above mentioned, p. 1818.; *Réaum.*, tom. ii. pl. 13, 14, 15, 16.); others feed upon the parenchyma of the leaf, raising, as it were, large circular blisters, the upper and under surfaces of the leaf remaining unconsumed. (*Réaum.*, tom. iii. pl. 3.) Some form tortuous labyrinths within the leaf, similar to those of the roseleaf miners; and some live in little cases of leaves, or silk, which they carry about with them. (*Réaum.*, tom. iii. pl. 7.)

Amongst the Coleopterous Insects, the common cockchafer (*S*carabæ'us *M*elolóntha *Lin.*, *M*elolóntha vulgàris *Fab.*, *fig.* 1648. *a*), is the most obnoxious of the leaf-eating species. The egg of this terrible devastator is white, and is deposited in the ground, where it soon changes into a soft whitish grub with

a red head, and about 1½ in. long. In this state it continues four years, during which time it commits the most destructive ravages on the roots, not only of grass, but of all other plants and young trees. When full grown, the larvæ dig in the



1648

earth to the almost incredible depth of 5 ft. or 6 ft., spin a smooth case, and then change into a chrysalis. In this state they remain till the following spring, when the perfect insect comes from the ground, and commences an immediate attack on the leaves of trees; and, according to Salisbury, the leaves of the oaks in Richmond Park were, during one summer, so eaten by it, that scarcely an entire leaf was left. The most remarkable account of the ravages of these insects is, however, given by Molyneux, in one of the early volumes of the *Philosophical Transactions*, in which their appearance in the county of Galway, in Ireland, in 1688, is narrated. They were seen in the day-time perfectly quiet, and hanging from the boughs in clusters of thousands, clinging to each other like bees when they swarm; but dispersing towards sunset, with a strange humming noise, like the beating of distant drums; and in such vast numbers, that they darkened the air for the space of two or three miles square; and the noise they made in devouring the leaves was so great, as to resemble the distant sawing of timber. In a very short time the leaves of all the forest trees, for some miles were destroyed, leaving the trees as bare and desolate in the middle of summer as they would have been in winter: they also entered the gardens, and attacked the fruit trees in the same manner. Their multitudes spread so exceedingly, that they infested houses, and became extremely offensive and troublesome. They were greedily devoured by the swine and poultry, which watched under the trees for their falling, and became fat on this unusual food: even the people adopted a mode of dressing them, and used them as food. Towards the end of the summer they disappeared suddenly, and no traces were perceived of them the ensuing year. (*Phil. Trans.*, xix. p. 743., &c.) About the middle of the last century, 80 bushels of these beetles were gathered on one farm near Norwich. (See *Encyc. of Agri.*, ed. 2., p. 1116.) The best method of destroying these insects is to shake the branches on which they hang at noonday, when they are in a state of stupor, and then to sweep them up and carry them away; or, torches may be held under the trees, which will stupify the beetles, and occasion them to fall. Birds are very useful in destroying these noxious insects. In the *Magazine of Natural History*, vol. v. p. 65., a story is told of a gentleman, who, finding his oak trees stripped of their leaves in the middle of summer, suspected some rooks of having destroyed them. "That the oaks were nearly bare was beyond dispute; and he had himself seen the rooks settling on them, and pecking away right and left with their bills. War was therefore declared against the rooks; but, fortunately, before hostilities were commenced, the gentlemen was convinced, by some one who knew more of natural history than himself, that the rooks were not in fault: on the contrary, they had only flocked to the trees for the sake of devouring the myriads of cockchafers, and of the larvæ of moths, which were the real depredators." Blackbirds act in the same manner; and the Rev. W. T. Bree relates an instance of these birds stocking up the grass to find the larvæ of the cockchafer, in a garden where there was plenty of ripe fruit. (See *Mag. Nat. Hist.*, vol. vi. p. 518.) The leaves are also devoured by the larvæ of one of the species of flea weevil (Orchéstes quércus). A'grilus víridis, Cryptorhýncus quércus, and Acálles róboris are also coleopterous insects found among the leaves of the oak. Aleyròdes proletélla, a minute but very interesting homopterous insect, also feeds upon the leaves of the oak. (*Réaumur, Mémoires*, tom. ii. pl. 25.)

The young Stems and Buds of the Oak are also infested by various species of

insects, chiefly belonging to the order Hemíptera of Linnæus (Homóptera *Latr.*), and furnished with an elongated rostrum, which they introduce without difficulty into the soft substance of the young parts, and thereby imbibe a sufficient supply of nourishment. Amongst these are to be mentioned, *Psýlla* quércus, Eriosóma quércus, A'phis quércus, and A'phis róboris. Cóccus quércus *Linn.* is a species about the size of a pea, which attaches itself to the branches at the base of the young stems. Another insect of the same genus, of a species not yet determined, is more injurious, as we learn from a communication made by M. Victor Audouin to the Entomological Society of France, on the 6th of April last (1836), by whom a portion of the bark of an oak, of about thirty years' growth, was exhibited, entirely covered with specimens of a coccus about the size of a pin's head. These insects were of a greenish or orange yellow colour, and were females, destitute of motion, adhering to the tree by means of their rostrum, which had pierced the bark. The oak had been in a languishing state, and was condemned to be cut down by the director of the Bois de Bologne, having, as M. V. Audouin judges, been brought into this state by the presence of many millions of these insects, which covered the entire trunk from 6 in. above the ground to the top, completely altering the natural colour of the tree, as from 50 to 100 might be counted in the space of a square inch.

The Acorns are devoured by the larvæ of a small weevil belonging the genus Balanìnus (B. glándium), and very nearly related to the nut weevil; as well as by the larva of Tínea Pomonélla (according to Geoffroy).

Galls. The various parts of the oak are also subject to the attacks of different species of hymenopterous insects belonging to the Linnæan genus Cỳnips (fam. Cynípidæ *Westw.*), Diplólepis *Oliv.* and *Leach*, or gall flies, so named from the various excrescences which they produce upon the leaves, stems, &c.; and which are designed by nature to protect the delicate ova and larvæ of certain insects. Entomologists say that the tumours on the leaf stalks, and those on the fruit stalks, are produced by different species of Cynípidæ; that the galls on the branch are produced by a distinct fly from that which produces the gall on the leaf; and it has also been ascertained, that the gall flies on the oak leaf are of at least three different kinds. There are also distinct kinds of gall flies for the root, bark, bud, and acorn cup, independently of the kermes and gall nut. The various species have been named, C. quercûs fòlii *Linn.*, C. q. báccarum *Linn.*, C. q. ínferus *Linn.*, C. q. petìoli *Linn.*, C. q. rámuli *Linn.*, C. q. córticis *Linn.*, C. q. gémmæ *Linn.*, C. q. pedúnculi *Linn.*, C. q. cálycis, C. q. terminàlis *Fab.*, &c. (See also M. d'Anthoine's *Cynipédologie du Chêne rouge* in the *Nouv. Journ. de Physique*, t. i. p. 34—39.)

There is another circumstance, also, connected with this subject, of considerable interest in a physiological point of view (independently of the manner in which the gall, consequent upon the puncture of an insect is formed), and which is thus alluded to by Dr. Johnston of Berwick :—" We observe that the irritation caused by the deposition and evolution of the egg will produce growth of the most curious kind; and differences in the irritation, too slight to be traced, will occasion very remarkable differences in the appearance of the growth. Thus, in the oak leaf, one insect irritation produces a globular smooth ball; and another, a depressed tumour, covered with a hairy scarlet coat. The first is seated on the substance of the leaf, and cannot be removed without destroying the texture of the part; the other seems almost placed on the leaf, and can be detached with facility. Examples equally remarkable will occur to every one who has paid any attention to this curious subject; and the growths appear to be not less uniform, and not less organised, than many parasitical fungi." (*Flora of Berwick upon Tweed*, vol. ii. p. 108.)

The British oak does not bear a gall nut of such powerful qualities as that of Q. infectòria; but, like the galls of commerce, those British galls are said to be the best from which the insect has not escaped. The largest species of British galls is generally called the oak apple, or oak sponge (*Spóngia quércina* of the ancients). These are produced by C. q. terminàlis *Fab.* (*Réaum.*

Mém., tom. iii. pl. 41. f. 1—5.): they are astringent, like the gall nuts, and may be used, like them, for dyeing black; but the colour produced, though more beautiful, is said to be less durable. These oak apples are much sought after annually on the 29th of May, that day being the anniversary of the Restoration of Charles II., and commonly known about London as Oak Apple Day. In Yorkshire, it is kept as a half-holiday at the schools, and is known by the couplet, —

"Twenty-ninth of May,
Royal Oak Day."

The oak apples are, also, still occasionally consulted as auguries by the superstitious, as they were in the time of Gerard, who says, "The oke apples being broken in sunder about the time of their withering, doe foreshew the sequell of the yeare, as the expert Kentish husbandmen have observed by the living things found in them; as, if they finde an ant, they foretell plenty of graine to ensue; if a white worm, like a gentill or magot, then they prognosticate murren of beasts and cattell; if a spider, then (say they) we shall have a pestilence, or some such like sickenesse to follow amongst men. These things the learned, also, have observed and noted; for Matthiolus, writing upon Dioscorides, saith that, before they have an hole through them, they containe in them either a flie, a spider, or a worme: if a flie, then warre insueth; if a creeping worme, then scarcitie of victuals; if a running spider, then followeth great sickenesse or mortalitie." (*Herb.*, 1341.)

Extravagant as are the inferences deduced, the observations of Gerard, for the most part, are correct; for diversity of season will affect the developement of these excrescences; and, if it be retarded, the egg, the larva, or perfect cynips, may be detected; and often, instead of the true gall insect, the larva, pupa, or imago, of an ichneumon (or, more commonly, one of the family Chalcídidæ belonging to the genus Callimòme *Spinola*) is found within the tumour: not that this fly has subsisted on the substance of the gall, but the parent ichneumon, or callimome, having deposited an egg within the gall while soft, the egg, or larva, of the cynips is preyed on by the parasite, and the interloper becomes possessed of the other's abode. When full grown, the oak apple is nearly as large as a moderate-sized dessert apple, and is of a pretty appearance, ornamented with yellow and pink. It is not quite spherical, but is irregularly depressed in various parts. Its surface is smooth and shining; and, when broken open, in its interior are found a great number of cells, each containing a fleshy grub, pupa, or perfect insect, according to the period of the year; the substance of the gall being fleshy, with numerous fibres running in the direction of the stems. The perfect insect is of a pale reddish buff colour, with immaculate wings. It is figured by Panzer *Faun. Ins. Germ.*, 88. t. 13.; and, notwithstanding the large size of the gall, is much smaller than some other oak Cynípidæ.



1649

Besides the oak apple, and that species emphatically styled "the gall," or "gall nut," several other excrescences on the oak, from their beauty, or their partial prevalence, deserve enumeration. The small round currant gall (*fig.* 1649.), of which several are frequently scattered throughout the length of the ament thread, or rachis, giving it the appearance whence they derive their name (*Réaum. Mém.*, tom. iii. p. 40. f. 1—6.), is produced by the C. quércus pedúnculi; the perfect insect of which is of a greyish colour, the wings being marked with an elongated cross. "There is a remarkable fact accompanying the deposition of the eggs on the dangling stalk of the catkins. The male flowers are

destined to wither and drop off as soon as their office of shedding the pollen is terminated; but if, before they have done so, they are seized and appropriated by the fly, they become permanent, and remain so until the maggot within the gall ceases to feed. From this circumstance, it is evident that the flow of the sap is in the proportion to its consumption; that 'bursting buds, lengthening shoots, expanding leaves, swelling fruit,' or swelling galls, equally attract currents of sap, and, in the last instance, even into a foreign channel; proving what Du Petit Thouars, and other botanists, have long ago advanced as their opinion; viz. that the growth of a tree is not caused by the motion of the sap, but the movement of the latter is caused by the distension of the various members." (*J. Main* in *Gard. Mag.*, vol. xii. p. 708.) The artichoke gall, or oak strobile (*fig.* 1650.), is probably the "oak nut" of the ancients: it is about the size of a filbert, and, from its closely imbricated scales somewhat resembling a fir strobile or an artichoke, it has so been termed. (*Réaum. Mém.*, tom. iii. pl. 43. f. 1—12.) It is produced by the Cŷnips quércus gémmæ, and is a most beautiful foliose gall; for the developement of the bud, although perverted, not being wholly prevented, the leaves are gradually evolved. "These galls," says Professor Burnet, "throw much light upon the natural metamorphoses of plants, especially on the transition from leaves to flowers, by the abortion of the axis of the bud, and the leaves hence becoming whorled; and, when the axis of each leaf (that is, its petiole and midrib) becomes in like manner curtailed, the gall assumes a still more florid form. Occasionally, in the oak, but more frequently in the willow, the gallic acid changes the ordinary green colour of the abortive leaves into a bright red, giving the preternatural growth very much the appearance of a rose; and hence Sàlix Hèlix, in which this occurs, has been not inaptly called the 'Rose Willow.' The *bedeguar*, or hairy gall (Gálla capillàris of the ancients), is a peculiar and very beautiful species, though rather scarce, for which reason it was formerly much esteemed. In structure it is very similar to the bedeguar of the rose; and it is usually situated in the axils of the leaves. It is considered excellent as a styptic. Whether the 'oak wool,' flocks of which were once so famed as wicks for lamps, but which, as Parkinson shrewdly observes, will not burn 'without oyle or other unctuous matter, as Pliny saith it will,' was the same as our cottony or woolly gall, the description of the ancient Gálla lanàta renders doubtful; for the flocks of wool are said to have been enveloped in a hard case; which structure is rather more analogous to that of our clustered galls, usually about six or seven in a group, and each the habitation of a separate grub; as in them the little hard galls containing the insects are included in a soft and spongy, though not woolly, material, and are defended externally by a hard ligneous case: these may by some, however, be esteemed the oak nuts, rather than the strobile one before alluded to." (*Amœn. Quer.* in *Eidoden.*)



1650

The oak berries, described as "sticking close to the body of the tree," were, doubtless, the galls produced by the Cŷnips quércus rámuli, or C. q. córticis; and the U'væ quércinæ, or oak grapes, were, not improbably, the aggregation of similar galls, which are occasionally found upon the roots, or at the line of demarcation between root and stem, and which are produced by the Cŷnips quércus radìcis. We have been favoured by the Rev. W. T. Bree with a very fine specimen of this gall, which he discovered, on the 22d of February, 1837, on the root of an oak tree (just at the surface), and which was at that time inhabited by a number of the Cŷnips quércus radìcis in the

winged state, ready to take advantage of the first warm day to burst forth from their prison. This gall, which is the largest excrescence that we have hitherto seen formed by any cynipideous insect, is irregularly oblong, and nearly 5 in. in length: it is 1½ in. in diameter in the thickest part, the general thickness being about 1 in.: its appearance is that of a piece of very fine-grained sponge. On making a section 1½ in. long by 1 in. broad, between 60 and 70 cells, closely packed together, and of an oval form, were discovered, each containing a single cynips. Taking the size of the entire gall into consideration, it must contain, at the lowest calculation, upwards of a thousand individuals, the produce, probably, of a single female cynips. The perfect insect is of a pale brownish colour, with a shining red abdomen, having two small dorsal black spots at the base. This gall was unknown to Réaumur, having been first described and figured by Bosc. (*Journ. de Physique*, 1794.) A figure, apparently of the same gall, is given in the *Insect Architect.*, p. 385.; but it is there erroneously stated that the inhabitant is identical with the cynips of the oak apple (C. quércus terminàlis); and this is supposed to be accounted for by the observation, that the root galls are "probably formed at a season when the fly perceives, instinctively, that the buds of the young branches are unfit for the purpose of nidification." Numerous other excrescences, and some most curious distortions, seem to be the result of the attacks of insects on the buds or branches of the oak in their embryo or infant state, of which the coadunate stems and witch knots are among the most remarkable; but it is doubtful whether many of these monstrosities are not idiopathic diseases of the tree.

The oak leaves, also, are occasionally observed covered with numerous galls of small size, and evidently belonging to different species, being of different forms, of some of which the insect has not yet been discovered. Several of them are figured by Réaumur. (*Mémoires*, tom. iii. pl. 35. fig. 3, 4. and 6., pl. 40. f. 13—15.) Some of these are of a larger size (*fig.* 1651.); not more than three or four being found upon a single leaf (*Rosel Ins. Belust. Suppl.*, tab. 69.); whilst others, which are as large as a boy's marble, and perfectly globular, are often found singly upon the leaves; the last being produced by C. quércus fòlii. (*Réaum. Mém.*, tom. iii. pl. 39. fig. 13—17., pl. 37. fig. 10, 11., pl. 40. fig. 8.) It is a curious circumstance connected with these large globular galls (and which is also observed in the gall nut), that, notwithstanding the large size of the galls, only a single insect is enclosed therein; so that a very small portion only of the centre of the gall is consumed, the cynips arriving at its perfect state within its small central prison, out of which it has to cut its way through a great portion of the solid substance of the gall. The surface of the majority of these galls is smooth; some, however, are imbricated, and others are clothed with a woolly kind of down, similar in its nature to the outside of the bedeguar of the rose. A gall of this kind is figured in the *Insect Architecture*, p. 388., found upon the twig of an oak; and in Dr. Nees von Esenbeck's collection of minute Hymenóptera, at present in Mr. Westwood's possession, there is a similar gall, of small size, upon an oak leaf, with the cynips by which it is produced (C. quércus lanàta *Nees MSS.*).

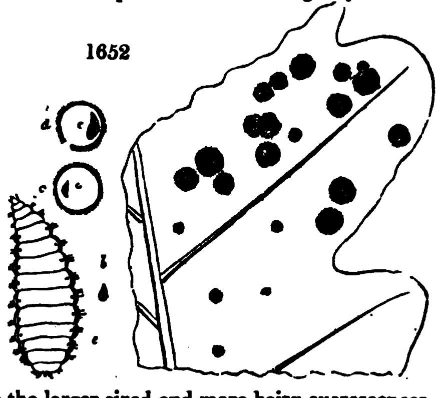
1651



Oak Spangles. Amongst the excrescences found upon the leaves of the oak, are to be noticed the reddish insular scales on the under side of the oak leaves mentioned by Mr. Lowndes (*Gard. Mag.*, vol. xi. p. 691.), and supposed by him to be parasitic plants. When full grown, they are about one eighth of an

inch in diameter, smooth on the surface next to the leaf, but hirsute and red on the outside: they are nearly flat, the thickest portion being the centre, where the point of attachment to the leaf is placed on the inside. This stalk, or funicular attachment, as it may be called, is very short, so that the excrescence nearly lies flat upon the leaf. (See *fig.* 1652. *a.*) The Rev. W. T. Bree (*Gard. Mag.*, vol. xii. p. 496.) calls them oak spangles, considering them to be the work of an insect. They are mentioned by several authors; but Mr. Westwood cannot find that their history has been satisfactorily traced by any writer upon the economy of insects. Nees von Esenbeck observes of these oak spangles, "Mirum tamen, gallas esse, quas etiamsi frequentissimas omnium, nemo hucusque incola sua fætas invenerit, vel *quomodo oriantur* cognoverit." (*Hymen. Monogr.*, ii. p. 266.) Réaumur has described and figured them (*Mém.*, tom. iii. mém. 12. pl. 42. f. 8. 10.) under the names of galles en champignon, from their resemblance to a flat mushroom. He was never, however, able to discover any appearance of an internal cavity; but he adds, "Il faut pourtant qu'il y en ait dans le milieu de quelques unes, car M. Malpighi assure l'avoir observé." He, however, discovered that the space between the under side of the excrescence and the leaf was the residence of a small worm, of an oblong form and yellowish amber colour, with two small points on the front of the head. Under some of these galls one or two only were found, but as many as a dozen under others. Fabricius, without alluding to these worms, gives the excrescences as the galls of Cŷnips longipénnis, or Diplólepis lenticulàtus of Olivier, with the observation, "Habitat in galla parva depressa, monothalama Galliæ. Mus. Bosc.;" and Coquebert has figured this species of cynips from the Boscian cabinet with two specimens of the galls, which are, however, represented so small, and so unsatisfactorily, that it is doubtful whether they be identical with Réaumur's galles en champignon. But in the collection of Chalcídidæ formed by Dr. Nees von Esenbeck, above mentioned, are contained specimens of this excrescence, accompanied by a specimen of the Eurŷtoma signàta; and in this author's *Monog. Hymen. Ichn. Affin.*, vol. ii. p. 43., is the remark: "Observavi etiam, Septembre mense, hujus speciei feminam, cum gallam illam orbiculatam depressam lenticularem umbonatam basi arcte appressam rubram hirsutam, quæ in pagina foliorum quercus inferiori frequens occurrit, ictu vulneraret. Non caussa igitur hujus speciei, sed parasita incolæ ejus, videtur." This inhabitant, on the authority of Geoffroy (who is, however, silent on the subject) and Fabricius, he doubtingly considers to be the Cŷnips longipénnis *Fab.* But the real habit of this Eurŷtoma, as he had previously ascertained, is to deposit its eggs in the gall produced by Cŷnips quércus gémmæ above described. The puncturing of the gall by the parasitic Eurŷtoma is not a proof of there being any internal inhabitant; because, as we learn from Réaumur, one or more worms take up their abode beneath the excrescences; and it might be these which the Eurŷtoma endeavoured to pierce with its ovipositor Mr. Westwood has, at the end of the month of September, discovered many of the minute larvæ mentioned by Réaumur, but never more than a single specimen under each. In *fig.* 1652. *b* shows the insect of the natural size; *c, d*, the galls reversed, and rather magnified, with different-sized larvæ; *e*, larva magnified. It was chiefly under the larger-sized and more hairy excrescences, the margins of which were deflexed, that he discovered these larvæ, which

1652



varied in size: it did not, however, appear that they had eaten any part of the under side of the excrescence. The larvæ found beneath the excrescence were destitute of legs, slightly hairy at the sides, and narrowed towards the head: they were depressed and fleshy, with two points at the mouth and at the extremity of the body: they were evidently the larvæ of some dipterous insect; and it does not appear that they had any actual connexion with the origin of the excrescence in question. At the same time, he opened some of the same excrescences, which seemed younger, without pubescence, and of a green colour, with the margins reflexed, and found in the centre a minute fleshy white mass, of a thickened and curved form, and without any appearance of articulation, which he is inclined to regard as the young embryo of one of the Cynípidæ.*

Other Insects found on the Oak. It still remains to notice the attachment of several species of insects to the oak, which do not obtain subsistence therefrom, but take up their abode either from some partiality to the tree itself, or for the purpose of feeding upon the different insects which live on it. The purple emperor butterfly (Apatùra I'ris Fabr.) belongs to the former class. The caterpillar of this most splendid of the English Lepidóptera feeds upon the broad-leaved sallow; but the purple emperor himself "invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which, on sunny days, he performs his aerial excursions; and in these ascends to a much greater elevation than any other insect I have ever seen, sometimes mounting higher than the eye can follow; especially if he happens to quarrel with another emperor, the monarch of some neighbouring oak: they never meet without a battle, flying upwards all the while, and combating with each other as much as possible; after which they will frequently return again to the identical sprigs from which they ascended." (*Haworth Lep. Brit.*, p. 19.) Of the latter class, the numerous tribes of Ichneumónidæ, Chalcídidæ, and other parasitic Hymenóptera, which keep in check the hosts of oak-feeding caterpillars, are especially to be mentioned; but it would be impossible to enter into any detail of their individual habits, or to enumerate the species. Some of the lace-winged flies (Hemeròbii) which feed upon the A'phides are also to be found upon the oak; as well as their curious eggs, placed in clusters at the extremity of long and very slender footstalks, giving them the appearance of minute fungi. Sílpha 4-maculàta, a coleopterous insect, also frequents the oak, in order to feed upon caterpillars; as do also splendid, but rare, species of Calosòma, C. inquísitor and C. sycophánta, the latter of which, both in the larva and perfect state, is especially observed, on the Continent, to attack the larvæ of the processionary moths described above. M. Bosc has observed (*Dict. d'Agricult.*, art. Chêne), and the observation affords an example of many admirable compensations so common in the economy of the animal kingdom, that this beetle is always more abundant in those seasons when the processionary caterpillars (which are extremely destructive to the oak) are also most abundant. (*Marquis, Essai sur les Harmonies Végétales et Animales du Chêne; Magas. Encyclop.*, 1814, tom. v.) Dr. H. Burmeister has published a valuable memoir upon the natural history and anatomy of the larva of Calosòma sycophánta, in the first volume of the *Transactions of the Entomological Society of London.*

Oak Barnacles. Among the many curious opinions entertained by the ancients respecting the oak, those relating to the oak barnacle are, perhaps, the most extraordinary. The following quotation, from Professor Burnet's elaborate article on the oak in Burgess's *Eidodendron*, contains some of the fables believed by the ancients respecting them; and we shall add all that we have been able to collect from other sources. "The word bairnaacle is from *bairn*, a child or offspring, and *aacle* or *acle*, the aac, or oak; signifying the child or offspring of the oak. Munster, in his *Cosmography*,

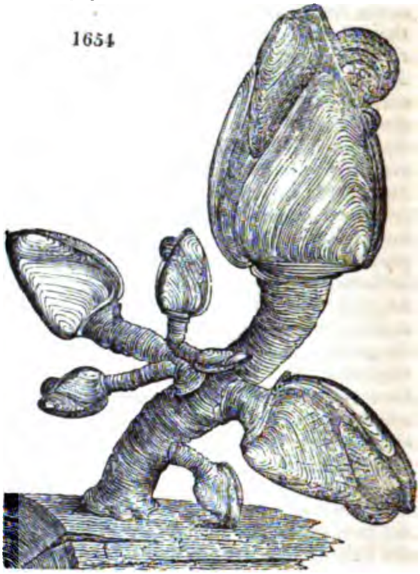
* Since this sheet was prepared for press, a memoir has been read at the Entomological Society, by Mr. W. Smith, giving an account of the discovery of winged specimens of a species of Cynips in these oak spangles. It is not, however, until the month of March, and long after the oak leaves have fallen to the ground, that the developement of the Cynips takes place, which accounts for the previous non-observance of the economy of the species by which the spangles are produced.

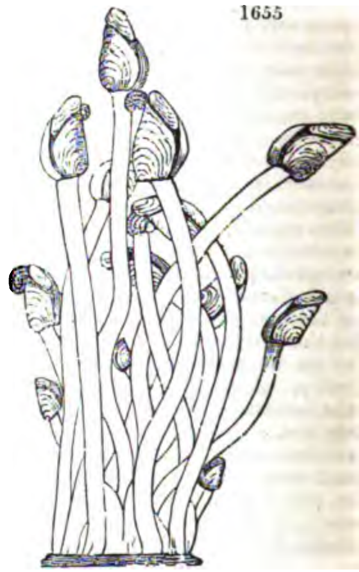
states 'that certain trees grow in Vomonia, near Scotland, towards the north, whose fruit, falling into the water, is turned into a bird.' Guadaguigua, an Italian author, affirms the like of the leaves of another tree; and Ruillius, in the 38th chapter of the 12th book of his *History of Plants*, mentions trees that 'bear cockles of which birds are produced.' This fable has been variously reported; and, among the *Philosophical Conferences of the Virtuosi of France*, the subject is formally discussed, and many authorities cited, 'concerning those trees of the Hebrides; the wood whereof, being rotted in the sea, is turned into birds like ducks.' Æneas Sylvius, in his *History of Europe*, says that he asked 'James VI. of Scotland touching those tree birds reported to be bred there; and learned from word of mouth of that learned king, that those trees grew not there, but in the Orcades; whereupon Æneas truly and handsomely replied, Miracula fugiunt.' Our countryman, Gerard, however, gives an excellent version of this story; and his testimony shall be preferred, as being that of an eyewitness; for his statement, he expressly declares, was drawn up in chief part from actual observation." (*Amœn. Quer.*, fol. 20.) The quotation from Gerard is as follows:—"There are found in the north of Scotland, and islands adjacent called Orchades, certain trees whereon do grow certain shells tending to russet, wherein are contained little living creatures; which shells, in time of maturitie, do open, and out of them do grow those little living things, which, falling into the water, do become fowles, which we call *barnakles*; in the north of England, *brant geese*; and in Lancashire, *tree geese*; but the other that do come fall upon the land, perish, and come to nothing. Thus much from the writings of others, and also from the mouths of people of those parts, which may very well accord with truth." He then subjoins the following account of what he solemnly affirms he had not only seen, but touched:—"There is a small island in Lancashire, called the Pile of Foulders, wherein are found the broken pieces of old and bruised ships, some whereof have been cast there by shipwracke; and also the trunks and bodies, with the branches, of old and rotten trees, cast up there likewise; whereon is found a certain spawn, or froth, that in time breaketh into certain shells, in shape like those of the muskle, but sharper-pointed, and of a whitish colour, wherein is contained a thing in form like a lace of silke, finely woven as it were together, of a whitish colour, one end whereof is fastened unto the inside of the shell, even as the fish of oisters and muskles; the other end is made fast unto the belly of a rude mass, or lumpe, which in time cometh to the shape and form of a bird. When it is perfectly formed, the shell gapeth open, and the first thing that appeareth is the foresaid lace, or string; next come the legs of the bird hanging out; and, as it groweth greater, it openeth the shell by degrees, till at length it is all come forth, and hangeth only by the bill: in short space after it cometh to full maturitie, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard, and lesser than a goose, having black legs, bill, or beake, and feathers black and white, spotted in such a manner as our magpie; called in some places a *pie-annet*; which the people of Lancashire call by no other name than a *tree goose*; which place aforesaid, and the parts adjoining, do much abound therewith, that one of the best is bought for three halfpence. For the truth hereof, if any doubt, let them repaire to me, and I shall satisfie them by the testimonie of good witnesses." (*Herball*, p. 1588.) Gerard gives a curious cut of the barnacle, with the head of the goose peeping out. This extraordinary fable took its rise from a mollusc (*Lèpas anatífera*, *figs.* 1653. and 1654.) being frequently found attached to pieces of oak wood that had fallen into the sea, and which animal had a kind of fibrous beard, something like the feathers of a bird. *Fig.* 1655., which represents a species of *Lèpas*, supposed to be new, that was taken



1653

from a log of wood washed on shore near Liverpool, in November, 1830, shows the manner in which the shells are found attached to the pieces of wood. In the *Amulet* for 1830 is a very interesting paper by Dr. Walsh, in which he speaks of the goose, which was anciently supposed to be produced from the *Lèpas anatífera*. "This bird, which is commonly called the barnacle goose (*A'nser Bérnicla* Willd.), is found in great abundance on the coast of Ireland, and particularly in the Bay of Bannow. It feeds on the tuberous roots of an aquatic grass, which is full of saccharine juice; and from this food, instead of the rank taste of other sea-fowl which feed partly on fish, the bird has a delicate flavour. The strange story of its springing from the shell of the *Lèpas* was first broached by Giraldus Cambrensis, who accompanied the early invaders to Ireland; and who, finding abundance of these delicate-tasted geese on the coast, and also seeing abundance of shells, attached at one end by a fleshy membrane to a log of wood, and having at the other a fibrous beard, like the feathers of a fowl, curling round the shell, fancied the rest of the story, which was readily believed from that natural appetite for the monstrous which prevails wherever the great mass of people are in a state of ignorance." Before the Reformation, Dr. Walsh tells us, the fishy origin of this bird was so firmly believed, that the question was warmly and learnedly disputed as to whether it might not be eaten in Lent.


1654

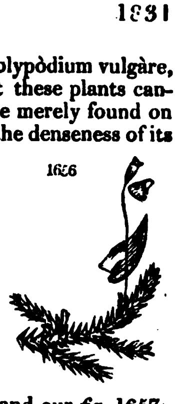

1655

Parasites and Epiphytes. The enumeration of the parasitic and other plants which live on the common oak, and which cease to exist when the tree ceases to live, would form, says M. Marquis (*Essai sur les Harmonies Végétales et Animales du Chêne*), "a long catalogue." Besides these, there are many which grow on the ground near the tree, and which are nourished by its decaying leaves. Among the plants which are found on the trunk and branches of the common oak, are various fungi, and numerous lichens, which cover the trunk with green, brown, white, or yellowish spots, till it often happens that, at a little distance, it resembles marble. Various kinds of ferns also grow upon the base of the trunk; and mosses, and other terrestrial plants, grow in the decaying bark.

The terrestrial plants, which are found rooted into the decaying bark of old

oak trees, are chiefly mosses; and, in very moist climates, *Polypòdium vulgàre*, and some other ferns. It is proper to state, however, that these plants cannot be considered as peculiar to the oak; but that they are merely found on that tree more commonly than on any other, on account of the denseness of its shade during summer. Some oak trees, among the hills of Westmoreland and Cumberland (for example, in Leven's Grove, and in the grounds of the poet Wordsworth at Rydal), have the trunks and main branches quite green, with the foliage of *P. vulgàre*; and others covered with a mossy envelope of different species of *Hýpnum*. The mosses most commonly found on trees are, *Hýpnum* denticulàtum *Eng. Bot.*, t. 1260., and our *fig.* 1656, *H.* tenéllum, *H.* sérpens, *H.* lutéscens *Eng. Bot.*, t. 1301., *H.* Pòhli, H. curvàtum, *H.* confértum, and *H.* cupressifórme *Eng. Bot.*, t. 1860., and our *fig.* 1658., Léskea incurvàta, L. trichomanöìdes, and L. complanàta *Eng. Bot.*, t. 1492., and our *fig.* 1657., Daltònia heteromálla, Néckera críspa, *N.* pinnàta, and various others; but none of these can be considered as exclusively confined to the oak.

1656



The mistletoe is the only truly parasitic plant which grows on the oak; but it is so rarely found on it in England, that many persons have doubted the fact of that tree ever having been its habitat. The mistletoe of the oak is, however, so intimately connected with all the traditions of the druids, that we cannot doubt the fact of its having been actually found by them; especially as we are told that its being discovered was so rare an occurrence, as to be attended by rejoicings. We also find that the apple tree was considered a sacred tree, and that apple orchards were always appended to the oak groves of the druids. (See Davis's *Celtic Researches*, &c.) Now, as we know that the mistletoe grows very freely on the apple tree, the seeds of the mistletoe might very naturally be conveyed from the apple orchard to the adjoining oaks, and some might vegetate on them. After numerous enquiries on this subject, we succeeded in March, 1837, in learning from Mr. D. Beaton, gardener at Haffield, near Ledbury, that Mr. Pitt, a small farmer in that neighbourhood, recollected seeing it on an oak tree near Ledbury, adjoining to which there was a willow tree loaded with mistletoe, from which the oak was supposed to have been supplied. This oak was cut down in 1831. Through the kindness of Mr. Moss, gardener to Earl Somers, at Eastnor Castle, Mr. Beaton received an account of an oak tree growing near the castle, on which there are several plants of mistletoe, one of which is of great age, and its branches occupy a space nearly 5 ft. in diameter. The mistletoe on the oak grows with greater vigour, and has broader leaves, than that which has grown on the apple; and its stem does not form that swelling at its junction with the oak, that it does on most other trees. Of these facts we had ocular demonstration from a large and handsome specimen of mistletoe growing from an oak branch, sent to us in March, 1837, by Mr. Beaton; and which, in order that the fact of the mistletoe growing on the oak might no longer be doubted by botanists or gardeners, we exhibited on April 4th, 1837, at the meetings of the Horticultural Society, and of the Linnæan Society, held on that day. (See *Gard. Mag.*, vol. xiii. p. 206.) Subsequently, Mr. Brackenridge, a Scotch gardener, who is just returned from Berlin, has informed us that he saw the mistletoe on several oak trees, near Lobsens, in the Duchy of Posen, about 11 miles on the south side of the town of Posen, near to an old cloister, the property of M. Ebers, to whom Mr. Brackenridge was, for a short time, gardener. Loránthus europæus, a parasite closely resembling the *Víscum álbum*, is fre-

1657



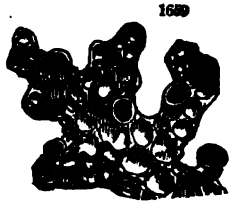


1658

quently found on the oak in the neighbourhood of Vienna, and is supposed by some to be the mistletoe of the druids. (See our art. *Víscum*, p. 1021.)

The principal Lichens that are found on the oak are what are vulgarly called the lungs of the oak, and its moss. The lichens sold under the name of the lungs of the oak are, Stícta pulmonàcea and S. scrobiculàta; and they are still much in demand in Covent Garden market, and other places, as a cure for consumption, and all disorders of the chest. S. pulmonàcea *Ach.*, syn. *Lìchen* pulmonàrius *Sow. Eng. Bot.*, t. 572., and our *fig.* 1659., is most plentiful in the northern or mountainous countries, where it clothes the trunks of old oaks " with a rich leafy garment. The fronds grow a little imbricate, but are considerably raised from the bark, into which their leaves are inserted.

1659



They are leathery, green, deeply divided, irregularly and bluntly lobed, strongly pitted; the interstices forming a kind of network, which, towards the margin of the frond, is powdery or woolly." The under side is downy, blistered, and pale, with a corresponding network of brown veins. The shields are, " for the most part, marginal, but not always: they are nearly sessile, flat, chestnut-coloured, with an elevated, smooth, green border. They are found at all times of the year, and in tolerable plenty." (*Eng. Bot.*, t. 572.) A decoction of this lichen is used with milk, to cure all diseases of the lungs. It is bitter, astringent, and mucilaginous, and promotes expectoration. It was first employed to cure coughs, Sowerby tells us, because its figure resembled that of the lungs. It is supposed to possess nearly the same properties as the celebrated Iceland moss (Cetrària islándica *Ach.*). The name of Stícta (that is, dotted) was given to this genus from the numerous little pits that are found on the under surface of the fronds. S. scrobiculàta *Ach.*, syn. *Lìchen* scrobiculàtus *Sow. Eng. Bot.*, t. 497., and our *fig.* 1660., is found on the trunks of oaks in the mountainous parts of England, Scotland, and Ireland, but not frequently. " The fronds spread loosely over each other, and are rather leafy than coriaceous, cut into round lobes, and obtusely notched. Their upper

1660



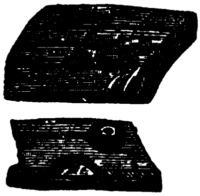
side is glaucous, full of irregular pits, smooth towards the base or centre; but towards the margin they are sprinkled with grey mealy warts. The under side is downy, brown, paler towards the edge, and spotted all over with irregular bare white spots. The shields are so rare, that Dillenius never saw them, but copied them from Micheli, in whose figure (t. 49.) they are drawn without any margin. After the examination of many hundred specimens," continues Sowerby, " we have found only two in fructification. In these the shields are about the size of mustard seed, of a tawny brown, flat, with an elevated, inflexed, downy (not mealy) margin, of the colour of the frond." (*Eng. Bot.*, t. 497.) The lichen figured by Gerard, as the " oke and his mosse," is *U'snea* plicàta *Ach.*: syn. *Lìchen* plicàtus *Lin. Sp. Pl.*, 1622., *Sow.*, *Eng. Bot.*, t. 257., and our *fig.* 1661.; *Múscus* arbòreus, &c., *Raii Syn.*, 64.; *U'snea* vulgàris, &c., *Dill. Musc.*, 56. t. 11. f. 1.; Usnée, *Fr.* " The whole plant is from 1 ft. to 2 ft., or even more, in length, forming a thick entangled mass of branching fibres, which are cylindrical, all more or less divaricated and undulated, none of them straight. They are of a uniform greenish freestone colour; the surface



1661

very smooth at first, but in the older parts rough with minute warts, supposed to be the male flowers. The main stems often crack here and there, discover-


1662


1663

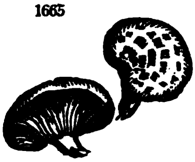
ing in the interstices a very tough white central fibre, which pervades the whole plant. The shields (*a*) are now and then to be found at the divarications of the principal branches, and nearly of the same colour: their margins radiate with rigid pointed fibres. This moss was formerly used as a styptic." (*Eng. Bot.*, vol. iv.)

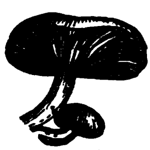
The other lichens that grow on the oak, says Mr. Borrer, are generally those that occur on other trees under similar circumstances of age, size, and situation. If a few of them have been observed on the oak, or on oak wood only, they are among the most obscure, and on that account extremely liable to have been overlooked elsewhere: such as Calícium microcéphalum *Eng. Bot.*, t. 1865.; C. hyperéllum *Ach.*, *Eng. Bot.*, t. 1832.; Spilòma punctàtum *Eng. Bot.*, t. 2472.; S. fuliginòsum *Brit. Fl.*, syn. S. microclònum *Eng. Bot.*, t. 2150., and our *fig.* 1662, but not of *Ach.*; Lecídea córnea *Brit. Fl.*, syn. Lìchen córneus *Eng. Bot.*, t. 965., and our *fig.* 1664.; Opégrapha lýncea *Brit. Fl.*, syn. Lìchen lýnceus *Eng. Bot.*, t. 809.; and the doubtful Opégrapha microscópica *Eng. Bot.*, t. 1911.; and Verrucària analépta *Ach.*, syn. Lìchen analéptus *Eng. Bot.*, t. 1848., and our *fig.* 1663.


1664

Fungi. Among those that are found on the wood are: *A*gáricus fùsipes *Bull.*, syn. *A.* cràssipes *Sow.*, t. 129.; *A.* erinàceus *Fries*, syn. *A.* lanàtus

1665




1666

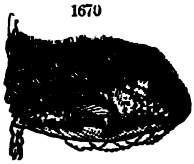

1667

Sow., t. 417.; *A* drýinus *Pers.*, syn. *A.* dimidiàtus *Schæff.*, t. 233., and our *fig.* 1665.; *A.* palmàtus *Bull.*, *Sow.*, t. 62., and our *fig.* 1666.; *A.* ostreàtus *Jacq.*, *Sow.*, t. 241., and our *fig.* 1667.; *A.* stipàtus *Pers.*; *A.* papyràceus *Pers.*, syn. *A.* membranàceus *Bolt. Fun.*, t. 11.; Merùlius lácrymans *Schum.*, syn. *B*olètus lácrymans *Sow.*, t. 113., the dry rot; *B.* arbòreus *Sow.*, t. 346.; Dædàlea quércina *Pers.*, *Grev. Crypt.*, t. 238., *Sow.* t. 181., and our *fig.* 1668.; D. biénnis *Fr.*, *B*olètus biénnis *Sow.*, t. 191.; Polýporus squamòsus *Fries*, *Grev. Crypt.*, t. 207., and our *fig.* 1669.; P. lùcidus *Fr.*, syn. *B*olètus lùcidus *Sow.*, t. 134.; P. sulphùreus *Fries*, *Grev. Crypt.*, t. 113.; P. híspidus *Fries*, *Grev. Crypt.*, t. 14., syn. *B*olètus velutìnus *Sow.*, t. 345., and our *fig.* 1670.; and P. dryàdeus *Pers.*, syn. *B*olètus pseùdo-igniàrius *Bull.*, t. 458., the false amadou. This species is not common in England; but it has been found on oak trees in Ragley Park near Alcester, at Himley near Dudley, and in Rockingham Forest. It is of a cinnamon colour when young, and whitish when old, changing, when bruised, to a reddish brown. When fresh, it distils drops of moisture from the


1668


1669

1670



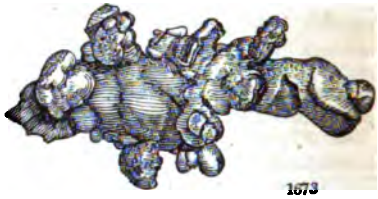
1671



1672



edge, which are sometimes glutinous. (*Eng. Fl.*, v. p. 144.) It was from this species that Bracconet obtained the boletic acid. (See *Encyc. of Plants*, p. 1007.) P. fomentàrius *Fries*, syn. *B.* fomentàrius *L.*, and our *fig.* 1672.; and P. igniàrius *Fries*, syn. *B.* igniàrius *L.*, and our *fig.* 1671.; are both used for making amadou, or vegetable tinder; the former being considered the best. P. fomentàrius is also the *agaric de chêne*, or *agaric des chirurgiens*, of the French druggists. To make the amadou, the outer covering is peeled off, and the interior part, which is soft and full of fibres, is boiled in a lie of wood-ashes. It is then dried, and beaten with a hammer till it becomes flat; after which it is again boiled in a solution of saltpetre. In this state, it makes excellent tinder, igniting with the slightest spark. The *agaric des chirurgiens* is prepared in the same manner, but not boiled in the solution of nitre. (See *Marquiss Essai*, &c.; *Dict. Classique d'Hist. Nat.*; *Thickness's For. Veg.*) The Laplanders are said to cure a violent pain in any part of the body by laying a piece of P. fomentàrius on the part, and igniting it. (*Eng. Fl.*, vol. v. p. 4.) P. vulgàris *Fr.* and P. mollúscus *Fr.* are common on fallen branches. An account of a curious deformed fungus (*fig.* 1673.), apparently a species of Polýporus, was sent to us in the year 1828. This fungus grew for 10 years on the oak from which it was taken, and was composed of an aggregate mass of tubercles, disposed in an irregular form: the pores were oval. (*Mag. Nat. Hist.*, i. p. 289.) Fistulìna hepática *With.*, *Grev. Crypt.*, t. 240., and our *fig.* 1674., is an eatable fungus; and it is much esteemed in Austria as an article of food; though the taste is rather acid, and the texture tough. It is sometimes found of enormous size. Mr. Graves found a specimen upon an ash pollard that weighed 30 lb. On the oak it is generally very small. Hýdnum Erinàceus *Bull.*, t. 34., and our *fig.* 1675., is found occasionally upon the oak; but it is rare in Britain. Theléphora rubiginòsa *Schrad.*, syn. Auriculària ferrugínea *Sow.*, t. 26.; T. spadícea *Pers.*, syn. Auriculària *tabácina* Sow. T. quércina *Pers. Syn.*, p. 573., *Grev. Crypt.*, t. 142., and our *fig.* 1676., syn. Auriculària corticàlis *Bull.*, t. 436. f. 1., was formerly called oak ear, or oak-bark ear, from some fancied similarity to the human ear. It is generally found on fallen oak branches, in woods, and is very common. T. hirsùta *W.* (*fig.* 1677.) is an allied species, and is equally common. Pezìza aurántia *Pers. Syn.*, p. 637., *Grev. Fl. Ed.*, p. 418., syn. *P.* coccínea *Sow.*, t. 78., and our



1673



1674



1675

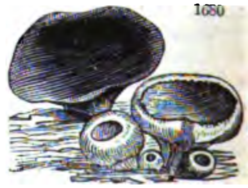
1677





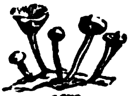
1676

1680





1678



1679



1681



1682

fig. 1678., is of a beautiful clear orange-colour within. It grows generally on the stumps of fallen oaks. *P.* bícolor *Bull.*, t. 410. f. 3., and *P.* cæ'sia *Pers. Syn.*, p. 657., are found on fallen oak branches; and *P.* aciculàris *Pers.*, syn. *P.* agaricifórmis, and our *fig.* 1679., grows in old hollow trees. Bulgària ínquinans *Fries*, Pezìza ínquinans *Pers. Syn.*, p. 631., *P.* polymórpha *Sow.*, t. 428., and our *fig.* 1680., is a curiously shaped fungus, and of a pitch-black colour. It is not uncommon on old stumps and pollard oak trees; and is very tough and elastic. B. sarcöìdes *Fries*, and our *fig.* 1681., is also found on old stumps. Cenangìum *q*uércinum *Fries*, syn. Hystèrium *q*uércinum *Pers. Syn.*, p. 110., and our *fig.* 1682., is extremely common on the small dead branches which remain attached to the tree. When young, it bears a close resemblance to a worm burrowing beneath the smooth bark. (*Eng. Fl.*, v. p. 212.) Stíctis radiàta *Pers. Syn.*, p. 674., and our *fig.* 1683., is found occasionally on the bark. Tremélla mesentérica *Retz*, and our *fig.* 1684., of a bright orange colour; and T. intuméscens *Smith Eng. Bot.*, t. 1870., and our *fig.* 1685.; are found on trunks and branches. The latter is "in perfection in very wet weather only, when it forms numerous soft and pulpy clusters, twisted and twined like the intestines of some animal; of a darkish dull brown, but with a shining surface, obscurely dotted." (*Smith.*) Exídia auricula Jùdæ *Fries*, Pezìza auricula *Lin.*, and our *fig.* 1686., grows on living trees. The "upper surface is corrugated; and the plants branching from the middle part, where they are strongest, are somewhat convoluted, so as to give the idea of a human ear. When the plant grows on a perpendicular stump or tree, it turns upwards." (*Smith.*) This fungus is found on the oak, the elder, and many other trees. Exídia glandulòsa *Fries*, syn. Tremélla fláccida *Eng. Bot.*, t. 2452., and our *fig.* 1687., vulgarly called witches' butter, is a curious drooping fungus, found on the bark. Scleròtium *q*uercígenum *Berk.* grows on felled oaks; Sphæ'ria botryòsa *Fries*, on hard oak wood; S. mutábilis *Pers.*, on indurated stumps tossing about in woods; S. áspera *Fries*, on oak branches; S. ùda *Pers.*, on oak wood in moist places; S. coronàta *Hoff.*, S. talèola *Fries*, and S. *q*uércina *Pers.*, on living branches; and S. leiphæ'mia *Fries*, on dead branches. S. nùcula *Fries*, and Hystèrium Carmichaeli*à*num Berk., syn. H. vàrium *Grev.*, are found on oak bark. H. rugòsum *Fries* is produced on the smooth branches of the oak, and a variety occurs on the beech; H. pulicàre, on the rotten wood of the oak; and Helminthospòrium subulàtum *Nees* on oak branches. Oídium aúreum *Link*, of a beautiful golden orange colour, was found in the hollow of the Fairlop Oak; and Psilònia gílva *Fries*, more frequent on the stems of the larger herbaceous plants, growing on the flat surface of a felled oak.



1683



1684



1685

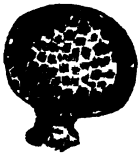


1686



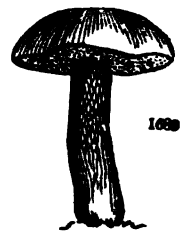
1687

Besides these, which all grow on the trunk and branches of the trees, the following are found on the roots: — Agáricus aurantíaco-ferrugíneus *With.*; and Polýporus frondòsus *Fries*, *Schæff.*, t. 127., which is reported excellent for food, sometimes attains the weight of 30 lb.; and, in Hungary, has been found 2 ft. high, and 3 ft. broad. When gathered, it smells like mice. Sclerodérma cítrinum *Pers.*, *Bolt. Fun.*, t. 116., and our *fig.* 1688., also grows on the roots. Amongst the fungi which grow on the ground under the shade of the oak



1688

are the eatable boletus and the truffle (the latter of which we shall treat of under the art. *Fàgus*), both of which are excellent in cookery. The eatable boletus, or cepe, or ceps, comprises three species, viz.: — *Bolètus edùlis Bull.* t. 60. and t. 495., *Dec. Fl. Fr.*, p. 330., *Sow.*, t. 111., *Roques's Hist. des Champ.*, p. 61. t. 4. f. 2. and t. 5. f. 1, 2, and 3., and our *fig.* 1689., syn. *B.* esculéntus *Pers. Obs. Mycol.*, i. p. 23., the *ceps ordinaire* of the French markets; *B.* æ`reus *Bull.*, t. 375., or *ceps noir; B.* aurantìacus *Bull.*, t. 236., the *gyrole rouge*, or *roussile*, of the French, a variety of *B.* scàber *Bull.*, t. 132. Besides these names, the different kinds of ceps are called, in the different provinces of France, *bruquet* and *potiron;* and in Italy, *porcino* and *ceppatello buono*. The ceps resembles a mushroom in appearance, with a large pileus, or cap, covered with a yellowish or brownish skin; and the lower surface consisting of slightly attached half-round tubes, in the same situation as the gills are in the common mushroom. These tubes, which are, in France, vulgarly called *le foin*, are removed with the skin and stalk, and only the solid part of the cap is eaten. (See *Dict. Classique d'Hist. Nat.*, tom. ii. p. 390.) The flesh of the solid part is white, firm, and extremely delicate, particularly when young; and it is applied in cookery, not only to all the purposes of the common mushroom, but it is eaten raw with salt and pepper, or made into soup. In Roques's *Histoire des Champignons*, 4to, several receipts are given for preparing it; and the following observations are added on its history and culture: —



1689

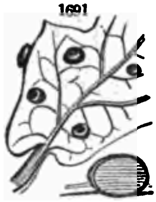
All the varieties of ceps are delicate. The flesh is fine, of a delicious flavour, an agreeable smell, and snowy whiteness; particularly in the young plants, which ought always to be preferred. A great quantityof this fungus is consumed in the south of France, particularly at Bordeaux and Bayonne, where it is frequently called *champignon Polonais*, the Polish mushroom; "because it was the Poles in the suite of Stanislaus Leczinski who taught the French that it might be eaten without danger." It is also much used in Hungary, and other parts of central Europe, and in Russia. "The best ceps grows on the banks of copse woods, planted with the oak or sweet chestnut; or on heathy ground, rather hilly, and shaded with oak trees. In the south of France, the first gathering of this fungus is in May, when the skin of the ceps is yellowish, and the flesh white, with a faint tinge of rose colour, and extremely delicate. The second gathering is in July, August, and September, when the skin becomes of a dark brown, and the flesh acquires a higher flavour. The last gathering is in November and December, if the weather continues open; but the flesh has then become soft, and nearly insipid. These fungi, which are extremely wholesome and nutritious, grow sometimes so large, that one or two will suffice for the repast of several persons." (*Hist. des Champ.*, p. 61.) The Rev. M. J. Berkeley, speaking of this fungus, in the fifth volume of the *English Flora*, says: "Though neglected in this country, it appears to be a valuable article of food. It resembles in taste the common mushroom, and is quite as delicate; and it might be used to much advantage, as it abounds in seasons when a mushroom is scarcely to be found. Like that, it can be cultivated, but by a much more simple process; as it is merely necessary to moisten the ground under oak trees, with water in which a quantity has been allowed to ferment. The only precaution requisite is, to fence in the portion of ground destined for the production of the fungus, as deer and pigs are very fond of it." (*Eng. Fl.*, v. p. 153.)

Several fungi grow on the leaves, some of the most remarkable of which are: *Agáricus dryophýllus Sow.*, t. 127., very fragile, and difficult to gather without breaking, or rubbing off the skin; *A. pórreus Fr.*, syn. *A. alliàceus Sow.*, t. 81., remarkable for its strong and abiding smell of

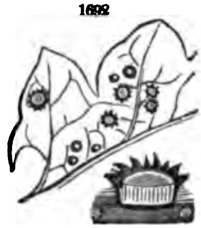
garlic; *A.* peliánthinus *Fr.*, syn. *A.* denticulàtus *Bolt.*, t. 4. f. 1., distinguished by the purple spiculæ scattered over and fringing the gills, like those on the lip of *O'rchis* fúsca; *A. a*ndrosàceus *L.*, *Bolt. Fung.*, t. 32., *Sow.*, t. 94., and our *fig.* 1690.; *A. p*terígenus *Fries*, a variety of the fern agaricus, with a lemon-coloured stem; Clavària *j*úncea *Fr.*, syn. C. fistulòsa *Bull.*, t. 463. H., an interesting species, lately discovered in Northamptonshire; Sphæ'ria bìfrons *Schmidt*, *Sow.*, t. 373. f. 4.; S. punctifórmis *Pers.*; Phacídium coronàtum *Grev. Crypt.*, t. 52., and our *fig.* 1692.; P. dentàtum *Schmidt*; Phòma pústula *Fries*; Hystèrium folíicolum γ maculàre *Berk.*, syn. H. maculàre *Grev.*, t. 129. f. 2., not H. maculàre *Fr.*; Scleròtium *q*uércinum *Pers.*, *Grev. Crypt.*, t. 77., and our *fig.* 1691.; Fusídium cándidum *Lk.*; Didérma globòsum *Pers.*; D. deplanàtum *Fries*; and *U*rèdo Quércus *Brondeau*, which appears to be very rare in this country. It has hitherto been found only in the neighbourhood of Bungay, by Mr. D. Stock, in a single locality.



1690



1691



1692

Statistics. The British Oak in the Environs of London. At Whitton Place, Twickenham, it is 75 ft. high, with a trunk 15 ft. in circumference. At Ham House, Essex, it is 70 ft. high; the diameter of the head is 77 ft.; and the trunk is 14 ft. 6 in. in circumference. On Laleham Common, about half-way between that village and Ashford Brook, near two large elms called the Brothers, stands a sound, vigorous, and noble oak. The girt, at 1 ft. from the ground, is 22 ft. 10½ in.; and at 3 ft., 16 ft. (See *Burnet's Amœn. Quer.*, fol. 14.)

The British Oak South of London. In Cornwall, at Penllergar, there are two oaks; the largest of which measures about 60 ft. in height: it has a trunk 18 ft. high before it throws out branches, and girts 13 ft. 6 in. at 4 ft. from the ground. It contains about 514 cubic feet of timber. The other is 12 ft. 9 in. in circumference at the same height from the ground, and contains about 366 ft. of timber. In Devonshire, at Bicton, it is 102 ft. high, the diameter of the head 97 ft., and the trunk girts nearly 20 ft.; at Lucombe, 33 years planted, it is 51 ft. high; at Endsleigh Cottage, 15 years planted, it is 35 ft. high; at Stevenstone Park it is 80 ft. high, the diameter of the head 71 ft., and the circumference of the trunk 16 ft. 6 in.; at Grilston, near South Molton, it is 64 ft. high, with a pyramidal head 58 ft. in diameter, the trunk is 9 ft. 1 in. in circumference, and the tree is in a growing state. The Ashton Oak (*fig.* 1693.) stands about four miles from Chudleigh. The beautiful drawing from which our engraving was made, was taken for us by J. Gendall, Esq., artist, Exeter, who observes that "the Ashton Oak has more the appearance of an ash than an oak, from the extraordinary cleanness of its trunk and limbs. It stands at the foot of a bold slope, which seems to have been a copse wood for many years. About 30 ft. from the lower roots of the tree, on one side, there is a considerable brook, and the limbs on this side have a tendency downwards, whilst on the other side, towards the slope, they all turn up. Beyond the brook is the village of Ashton, backed by Haldon Hill." (*J. Gendall. Cathedral-yard, Exeter, April* 3. 1837.) The height of the tree to the fork, where there is a decayed branch, is 75 ft.; and the trunk, at 4 ft. from the ground, measures 17 ft. 6 in. in circumference. We received the first account of this tree through the kindness of John Collier, Esq., M.P., who forwarded to us the following extract from a letter which he had received respecting it:—"In the year 1805, while on a visit at Chudleigh, I was induced to walk to Ashton, about 4 miles, to see the celebrated oak, from which I had heard that a plank 60 ft. in length could be cut. We measured the tree at 4 ft. from the ground, and found its girt to be 16 ft., and at the surface of the ground 20 ft. From its loftiness and its being devoid of lateral branches, I believe that the information I had received was correct, and that a plank of 60 ft. in length might have been procured from it. . . . . . The Ashton estate was part of the property of Sir John Chudleigh, of Haldon House, who was of the same family as the celebrated Duchess of Kingston, she, I believe, being his niece. On the death of Sir John his property was divided among his four sisters, and the Ashton estate was afterwards sold to Lord Exmouth, who had property on the other side of the river; but some disputes as to the title threw the affair into Chancery." (*James White. Dec.* 5. 1836.) In March last (1837) our attention was directed, by His Grace the Duke of Bedford, to a paragraph respecting this tree in the *Western Times*, from which it appears that this oak, "which is considered the finest in the county, has been sold for 60 guineas, and will be felled as soon as the barking season commences. About 30 years since it was sold for 100*l.*, but a chancery suit saved it from the feller till the present period. 70*l.* were offered for it several years back." The oaks known as Wistman's Wood, of which *fig.* 1694. is a portrait copied from Carrington's *Dartmoor*, have been long celebrated, as already noticed (p. 1757. and p. 1786.) In Dorsetshire, at Melbury Park, 300 years old, it is 60 ft. high, the diameter of the head 68 ft., and the girt of the trunk 33 ft.; at Compton House, 200 years old, it is 80 ft. high, and the girt of the trunk 21 ft. In Hampshire, at Strathfieldsaye, it is 90 ft. high, the diameter of the head 89 ft., and girt of the trunk 19 ft.; at Hursley Park are many fine specimens, one of which contains nearly 14 loads of timber; at Hackwood Park, three oaks were felled in 1836, which measured 101 ft., 115 ft., and 116 ft. in length, and 8 ft. 4 in., 9 ft. 4 in., and 10 ft. 4 in., in girt; at Sharfield, near Basingstoke, on another estate of Lord Bolton's, there is a fine growing oak, 12 ft. in girt at 3 ft. from the ground, 80 ft. high, and with branches projecting 30 ft. from the trunk; in the New Forest there are 12 oaks, called the Twelve Apostles, which are fine sound trees, though somewhat stag-horned in the branches, the largest has a trunk measuring 22 ft. 6 in. in circumference. In Kent, at Cobham Hall, are many fine specimens, with trunks 24 ft. in circumference. The Bounds Park Oak, near Tunbridge Wells, is figured in the folio edition of Strutt's *Sylva Britannica*:—"At 2 ft. above the ground, it is 22 ft. in circumference; its trunk is straight and uniform; it throws out a great number of limbs, and

1695



bears a grand head; it is 69 ft. high; and the extent of its boughs, from east to west, is 114 ft." (*Lauder's Gilpin*, ii. p. 256.) There are several fine oaks in the park of Earl Stanhope at Chevening, near Seven Oaks. One of these is 14 ft. 6 in. in girt at 3 ft. from the ground; and the diameter of the head is 84 ft. From a leaf of this tree sent us by Earl Stanhope, it would appear to be *Q.* sessiliflòra; but of this we are not certain. In Somersetshire, at Brockley Hall, it is 80 ft. high, with a trunk above 36 ft. in circumference; at Nettlecombe, 220 years old, it is 100 ft. high, the diameter of the head 50 ft., and circumference of the trunk 20 ft. In Surrey, at Claremont, it is 76 ft. high, the diameter of the head 80 ft., and girt of the trunk 13 ft. 6 in. In Sussex, at Cowdray, it is 60 ft. high, the diameter of the head 103 ft., and girt of the trunk 16 ft. 6 in.; at Kidbrooke, 100 years old, it is 60 ft. high, the diameter of the head 88 ft., and girt of the trunk 21 ft. The Rookery Oak, at Kidbrooke, the seat of Lord Colchester, is 90 ft. high; the circumference of the trunk, at 1 ft. from the ground, is 18 ft., and the diameter of the head 70 ft.: the species is *Q.* pedunculàta. The Sussex Farm Yard Oak, on the same estate (*Q.* sessiliflòra), is 70 ft. high, with a trunk 21 ft. in circumference, and a head 90 ft. in diameter. In Horsfield's *History, &c. of Sussex*, Append. II., Botany, by T. H. Cooper, Esq., F.L.S., p. 6., published 1835, is an account of "a very fine oak, perhaps the finest in the county, which grows in the pleasure-grounds of Sheffield Park. The but or bole, in height 22 ft., measures 15 ft. 5 in. in circumference; and, as the tree is in a most thriving state, it will attain a much larger size. The amount of timber now contained in the tree is more than 11 loads. The oak in the kitchen-garden is also a beautiful tree, although not so large as the other: it measured

1691



13 ft. 8 in. in circumference, and has attained a good height; the branches spread in the form of a dome and nearly touch the ground, in all parts of the circle sheltered by the luxuriant foliage of this splendid specimen; the diameter of this circle is 95 ft." In Wiltshire, at Longleat, 250 years old, it is 60 ft. high, the diameter of the head 75 ft., and girt of the trunk 19 ft. 6 in.; at Wardour Castle, 200 years old, it is 50 ft. high, the diameter of the head 45 ft., and girt of the trunk 25 ft.; at Longford Castle it is 60 ft. high, the diameter of the head 80 ft., and girt of the trunk 15 ft.; in Savernake Forest there are many large and noble oaks, besides those mentioned in p. 1771. and p. 1792.

The British Oak North of London. In Bedfordshire, at Woburn Abbey, Q. pedunculàta is 75 ft. high, and the circumference of the trunk is 18 ft. 6 in.; Q. sessiliflòra is 90 ft. high, the diameter of the head is 63 ft., and the girt of the trunk 21 ft. 6 in. Near Bedford, on an estate also belonging to the Duke of Bedford, stands a remarkably fine growing tree, called the Oakley Oak, which girts 15 ft. 9 in. at 2 ft. from the ground; the height is 75 ft., and the diameter of the head, from the extremities of the branches, is 116 ft. In Howe's Park, Q. pedunculàta is 85 ft. high, and the girt of the trunk 15 ft.; and Q. sessiliflòra is 90 ft. high, and the circumference of the trunk 29 ft. At Flitwick House there is an old oak 60 ft. high, which girts 18 ft.; it has a straight trunk about 35 ft. high before it forms any branches; there is also a young oak, planted in 1818, which, in 1836, was 30 ft. high, and 2 ft. 5½ in. in circumference. At Ampthill Park there are two fine old oaks: the first (Q. pedunculàta) is 59 ft. high, and the trunk girts 25 ft.; the second (Q. sessiliflòra) is 60 ft. high, girting 24 ft., and with a head 100 ft. in diameter. In Breconshire, the largest oak is one (now in a state of decay) which girts 25 ft. at 5 ft. from the ground: it grows with some other fine trees near the old mansion of Pantycored, near Brecon, and belongs to Dillwyn Llewelyn, Esq. In Buckinghamshire, at Claydon House, the seat of Sir Harry Verney, are two very fine oaks: the circumference of the trunk of the largest is 27 ft., and the diameter of the head 120 ft.: the circumference of the trunk of the other tree, at the smallest part, is 21 ft. At Harleyford is an oak 16 ft. in girt, and dividing into two enormous limbs, each from 9 ft. to 12 ft. in circumference. Waller's oaks, near Beaconsfield, are about 100 ft. high, and 8 ft. in circumference: they were planted by Waller in 1730. In Caermarthenshire, at Golden Grove, are many fine oaks, supposed to be about 300 years old, above 80 ft. high, and with trunks from 15 ft. to 18 ft. in circumference. In Cambridgeshire, at Wimpole, is an oak 75 ft. high, with a trunk 13 ft. in girt, which is clear to the height of 50 ft. In Cheshire, at Combermere Abbey, there is a pollard oak 80 ft. high, the circumference of the trunk 24 ft., and diameter of the head 75 ft.; there are also some oaks in a growing state, about 70 ft. high, with heads from 75 ft. to 80 ft. in diameter, and trunks girting about 12 ft. (For other oaks at Combermere see p. 1756.) At Buckland Hill, according to Mitchell, there is an oak with a trunk 24 ft. in circumference at 5 ft. from the ground, and which, at 8 ft., branches out into four large limbs, about 60 ft. high, and spreading over a diameter of 120 ft. In Derbyshire, the approach to Kedleston House, the seat of Lord Scarsdale, is through one of the finest oak groves in the kingdom. We have received the following account of these trees from the Honourable and Reverend Frederick Curzon:—" The largest oak, called, *par excellence*, the 'King Tree,' measures in girt, at 6 ft. from the ground, 24 ft.; it has a noble trunk of 60 ft. without a single branch, and appears in a healthy and growing state. The late Lord Scarsdale refused 300 guineas for it about 20 years ago, when he sold a tree standing near it for 204 guineas. There are about a dozen more trees in the same grove, with trunks girting from 19 ft. to 20 ft. each." In Durham, at Ravensworth Castle, there is an oak which is supposed to be the largest in the county: it is 70 ft. high, with a trunk 18 ft. 4 in. in circumference at 1 ft. from the ground, and 17 ft. at 9 ft.; the head is 80 ft. in diameter. In Essex, the Lawn Oak, at Writtle Park, according to Burnet, is 25 ft. in girt at 5 ft. from the ground; and the great Northfield Oak, in the same park, girts 31 ft. 6 in. at the same height. At Hempstead, near Saffron Walden, is an old oak, the trunk of which, we are informed by J. Pease, Esq. M.P., girts from 50 ft. to 53 ft. In Flintshire, at Gredlington, the seat of Lord Kenyon, there are two oaks, one of which is 96 ft. high, and girts 13 ft. 9 in.; and the other is 83 ft. high, and girts 15 ft. In Glamorganshire are several fine trees; and among others the Sketty Oak. We have received the following account of this tree from that excellent British botanist and ardent lover of trees, L. W. Dillwyn, Esq., M.P.:—" This tree grows at Lower Sketty, about 2 miles from my house. When I first came into this neighbourhood, in 1802, it was a magnificent tree; but, a few years afterwards, it was much damaged by lightning; and one of the main branches, within these 3 or 4 years, has been torn off by a storm. The trunk is quite hollow, with a circumference of 37 ft. 9 in. at the base; and it measures 24 ft. 2 in. at 4 ft. 6 in. from the ground, before any of the enlargement occasioned by the branches begins." We have received the following account of the Lanelay Oak, also, from Mr. Dillwyn:—" It grows about a mile and a half from Lantrissant; and my friend the Rev. J. M. Traherne has sent me its dimensions as follows:—' 38 ft. 6 in. round the base, and 27 ft. 2 in. at 3 ft. from the ground.' This tree is in a much more shattered state than the one at Lower Sketty: one side of the hollow trunk

is greatly decayed, if not altogether dead; and the few remaining branches on the other side are so overloaded with ivy, as greatly to endanger their safety in every storm." At Aberpergwm, the seat of Wm. Williams, Esq., there is a fine growing tree, 25 ft. in girt near the ground, and 15 ft. at the height of 3 ft. In Gloucestershire, at Doddington Park, is a growing tree 75 ft. high, with a trunk 12 ft. in girt, and a head 90 ft. in diameter. In Herefordshire, at Croft Castle, it is 120 ft. high, diameter of the trunk 4 ft., and of the head 75 ft.; another is 75 ft. high, diameter of the trunk 8 ft., and of the head 96 ft.; another, a remarkably regular and handsome tree, 72 ft. high, diameter of the trunk 10 ft., and of the head 104 ft.; and another, an old pollard, 56 ft. high, diameter of the trunk 12 ft. 8 in., and of the head 81 ft. At Eastnor Castle, 18 years planted, it is 30 ft. high. About 8, miles from Moccas Court is the Eardisley Oak, a fine old tree, having an immense head, wider than that of the Cowthorpe Oak: the trunk is 18 ft. high, and 30 ft. in girt at 3 ft. from the ground; with a hole at the ground, which, in warm weather, serves as a retreat for pigs and sheep. The Nun-Apton Oak, near Brinefield, has a trunk 33 ft. in girt at 5 ft. from the ground. The Moccas Court Weeping Oak (*fig.* 1588. in p. 1732.) is 75 ft. high; the circumference of the trunk is 13 ft. 6 in., and the diameter of the head, in one direction, is 100 ft. In Tibberton Park there is an oak (*fig.* 1587. in p. 1746.) which, as we are informed by its proprietor H. Lee Warner, Esq., has reached the astonishing height of 127 ft.; the trunk 27 ft. 6 in. in height before it divides into branches; its circumferences averages about 18 ft. In Hertfordshire, at Hatfield, are many fine specimens: one, with a trunk 36 ft. in circumference, and clear to the height of 30 ft., contains 270 cubic feet of timber. In Lancashire, at Holker Hall, there is an oak 75 ft. high, with a trunk girting 21 ft.: the diameter of the head is 66 ft. The Broad Oak, at Winwick Hall, is only 30 ft. high; but the circumference of the trunk, at 1 ft. from the ground, is 17 ft., and the diameter of the head 90 ft.: at 10 ft. from the ground, there are 8 branches, which grow in a horizontal direction; and at 10 ft. from those are 6 more branches, spreading in a similar manner. In Leicestershire, at Donnington Park, 80 years old, it is 68 ft. high, the circumference of the trunk 12 ft., and the diameter of the head 81 ft.; another, very old, is 64 ft. high, the diameter of the head 66 ft., and the trunk 33 ft. in circumference. At Gopsall, at the seat of Earl Howe, *Q. pedunculàta* is 70 ft. high; circumference of the trunk 18 ft., and diameter of the head 77 ft. In Montgomeryshire, in the park at Powis Castle are many fine oaks: one of these is 90 ft. high, with a trunk girting 21 ft. at 3 ft. from the ground; the diameter of the head 93 ft.: it contains about 1335 cubic feet of timber. "The handsomest oak I ever saw," says Marsham, "was in the Earl of Powis's noble park, by Ludlow, in 1757; though it was but 16 ft. 3 in. in circumference at 5 ft. from the ground; but it ran quite straight and clear of arms (I believe, full 60 ft. high), and had a large fine head." (*Bath Soc. Papers*, vol. i. p. 66.) Possibly this may be the tree mentioned above. In Monmouthshire, at Tredegar Park, 175 years old, it is 85 ft. high; the circumference of the trunk is 18 ft., and the diameter of the head 75 ft. In Norfolk, at Merton Hall, is an oak with a trunk 63 ft. 2 in. in girt. (See *fig.* 1602. in p. 1764). It is said that, some years ago, a still larger oak, in the same park, was blown down. Another oak at Merton measures 25 ft. in circumference at 5 ft. from the ground. There are many oaks in the wood with trunks varying from 12 ft. to 24 ft. in circumference. One of these has a clear trunk 22 ft. 10 in. in height, averaging a girt of about 13 ft., and perfectly straight. This is a magnificent tree, with a very handsome head. In Northamptonshire, at Shipley House, it is 350 years old, the circumference of the trunk 27 ft., and the diameter of the head 171 ft.; at Easton Park is one 26 ft. in girt at 1 ft. from the ground; and in Chase Park is one 26 ft. 3 in. in girt at 1 ft. from the ground. In Yardley Chase are many fine oaks, besides those already mentioned in p. 1765.: one, a growing tree, is 70 ft. high, with a trunk 12 ft. in circumference, and 28 ft. high to the first branch; another has a trunk 26 ft. 3 in. in circumference; and several have trunks varying from 15 ft. to 20 ft. in circumference. At Strelly Hall, the seat of Thomas Webb Edge, Esq., is the Strelly Broad Oak, which was measured in 1739, after its main arms had been blown off; when it contained 560 cubic feet of timber, and its head was 180 ft. in diameter. It is now a mere shell; but its trunk still measures, at 3 ft. from the ground, 18 ft. in circumference. At Deene Park, the seat of the Earl of Cardigan, there are several large old oaks, one of which is 45 ft. high, with a trunk girting about 14 ft. 6 in. at 3 ft. from the ground, and a head 81 ft. in diameter. A pollard oak, in the same park, has a trunk which girts 17 ft. 3 in. at 3 ft. from the ground. In a wood at Corby is an oak 70 ft. high, with a trunk girting 16 ft. An oak on the Pascoe estate, in the same county, has a trunk 25 ft. 6 in. in girt, which rises (averaging about 15 ft.) to the height of about 22 ft. or 24 ft.; when it forms what may be called an apple-tree head. In Northumberland, at Hartburn, 83 years planted, it is 74 ft. high; the circumference of the trunk is 12 ft., and the diameter of the head 60 ft.; this trunk is without boughs to the height of upwards of 50 ft. In Nottinghamshire, at Clumber Park, it is 58 ft. high, the circumference of the trunk 13 ft. 6 in., and the diameter of the head 72 ft.: at Thoresby Park, it has a trunk, clear of branches, 45 ft. high, though only 7 ft. 6 in. in circumference, and is a fine young tree. In Oxfordshire, at Blenheim, is a fine oak, nearly 30 ft. in girt. In Cornbury Park, *Q. pedunculàta* is 48 ft. high, with a trunk 34 ft. 3 in. in circumference near the ground, and 22 ft. 3 in. at the height of 17 ft.: the diameter of the head is about 60 ft. In Pembrokeshire, at Stackpole Court, *Q. sessiliflòra* is 100 ft. high, with a head 60 ft. in diameter, and a trunk 13 ft. 6 in. in circumference. At the height of 13 ft., it divides into three branches, forming a handsome and well-proportioned head. It is difficult to name the age; but 150 years ago it was designated the Large Oak at Stackpole. In Radnorshire, at Maeslaugh Castle, it is 50 ft. high; the diameter of the head is 97 ft., and the circumference of the trunk 17 ft. 3 in. In Rutlandshire, in Normanton Park, there is an oak 65 ft. high, diameter of head 90 ft., girt of the trunk, at 3 ft. from the ground, 14 ft. 3 in.: the species is *Q. pedunculàta*. Another oak, in the same park (*Q. sessiliflòra*), measured 16 ft. in circumference at 3 ft. from the ground. Its height, and the diameter of its head, are nearly equal to the preceding. They are standing some 30 yards distant from each other, and within 50 yards of a bog. The latter is widely different from the former in its general appearance; and its straggling branches and pallid leaves give it a very naked aspect. The other, on the contrary, with its deeply jagged dark green leaves, and robust habit, has a sombre appearance. In Shropshire, at Porkington, is an oak 50 ft. high, with a trunk nearly 20 ft. in circumference, and a head 90 ft. in diameter; and another, in the same park, 100 ft. high, has a trunk 18 ft. in girt to the height of 18 ft., and a head 65 ft. in diameter: at Hardwicke Grange, 10 years planted, it is 25 ft. high: at Willey Park, 15 years planted, it is 39 ft. high; at Kinlet there is a growing oak 112 ft. high, the girt of the trunk 16 ft. 6 in., and the diameter of the head 84 ft.; also many fine specimens, from 80 ft. to 100 ft. high, with trunks from 15 ft. to 24 ft. in circumference, and the branches extending from 80 ft. to 110 ft. In the natural woods adjoining Kinlet are numerous trees both of *Q. pedunculàta* and of *Q. sessiliflòra*. In Staffordshire, at Trentham, there is an oak 60 ft. high, the circumference of the trunk 21 ft., and the diameter of the head 70 ft. At Bagot's Park, there is a twisted oak, about 56 ft. high; circumference of the trunk, at 3 ft. from the ground, 27 ft. 2 in., and containing 720 cubic feet of nearly all crooked timber. This is an old tree, and has lost much of its height and many of its boughs. In the same park are six noble trees, called the Cliff Oaks, in a healthy growing state, and perfectly sound. The largest of these, which is called the King Tree, is 100 ft. high, with a trunk 18 ft. 7 in. in circumference at 3 ft. from the ground, and containing 690 cubic feet of timber: the others vary in height from

80 ft. to 90 ft., and the circumference of the trunk from 15 ft. to 18 ft.: only one of these is showing any symptoms of decay. For the other remarkable trees in Bagot's Park, see p. 1769. In Suffolk, in the Bury Botanic Garden, 8 years planted, it is from 20 ft. to 30 ft. high; at Finborough Hall, 100 years old, it is 75 ft. high, the circumference of the trunk 18 ft., and the diameter of the head 82 ft. In Warwickshire, at Coombe Abbey, 600 years old, it is 70 ft. high, the circumference of the trunk 21 ft., and the diameter of the head 101 ft.: at Springfield, 20 years planted, it is 35 ft. high: at Allesley Rectory, *Q. pedunculàta*, 26 years planted, is 32 ft. high; and *Q. sessiliflòra*, of the same age, is 39 ft. high, with a trunk 2 ft. 3 in. in circumference at 2 ft. from the ground: at Merivale is a magnificent forest of oaks, many of which have trunks 60 ft. high, and of nearly the same diameter at the top as at the bottom. In Worcestershire, at Hagley, is a noble oak, with a trunk 22 ft. 9 in. in circumference, and the extent of the branches 105 ft.: at Croome, *Q. pedunculàta* is 85 ft. high, with a trunk 19 ft. in circumference, and a head 105 ft. in diameter; another tree has a head 114 ft. in diameter; *Q. sessiliflora* is 80 ft. high, with a trunk 18 ft. in circumference. There are numerous other oaks at Croome, of both species, varying from 70 ft. to 80 ft. in height, and with trunks from 15 ft. to 18 ft. in diameter. In Yorkshire, at Castle Howard, it is 90 ft. high, the circumference of the trunk 15 ft., and diameter of the head 90 ft.; at Ackworth, *Q. pedunculàta* is 120 ft. high, circumference of the trunk 11 ft., diameter of the head 74 ft.; at Woodthorpe, an oak, supposed to be 1000 years old, is 60 ft. high, the diameter of the trunk 33 ft., and of the head 66 ft., the trunk of this tree is a mere shell. At Hovingham Hall, the King Oak is 91 ft. high; the circumference of the trunk, at 1 ft. from the ground, is 24 ft.; and at 32 ft., where it breaks in branches, 12 ft. 9 in. the diameter of the head is 71 ft. The Queen Oak is about 70 ft. high, and 24 ft. in circumference at 1 ft. from the ground: the diameter of the head is 94 ft. Both are sound trees, from 250 to 300 years old. In Studley Park, in this county, are some of the noblest oaks in Europe, perfectly sound, and most of them in a growing state. The largest of these (*Q. sessiliflòra*) is 118 ft. high, with a trunk 33 ft. 6 in. in circumference at 1 ft. from the ground, and 20 ft. at 5 ft. from the ground; and a head 96 ft. in diameter. (See *fig.* 1585. in p. 1744.) The largest *Q. pedunculàta* is 94 ft. high, with a trunk 22 ft. 4 in. in circumference, and rising 21 ft. to the fork; another *Q. pedunculàta* (see *fig.* 1581. in p. 1742.; which is a portrait by H. W. Jukes, Esq., made, along with those of above twenty other trees figured in this work, at the expense of Mrs. Lawrence), is 80 ft. high, with a trunk 24 ft. 6 in. in girt at 1 ft. from the ground, and 22 ft. 8 in. at the smallest part; and a head 91 ft. in diameter. There are many other fine oaks in Studley Park, varying from 80 ft. to 90 ft. high, with trunks from 20 ft. to 30 ft. in girt, and clear of branches to the height of from 20 ft. to 40 ft.

The British Oak in Scotland. In the neighbourhood of Edinburgh, there is an oak, in Dalmeny Park, 70 ft. high, with a trunk 15 ft. 6 in. in circumference, diameter of the head 96 ft.; another oak, 70 ft. high, has a trunk only 6 ft. 5 in. in circumference, but carries nearly that thickness to the height of 30 ft. before it throws out branches. At Barnton Hall is an oak 80 feet high, with a trunk 11 ft. in circumference, and a head 82 ft. in diameter: the trunk is sound, and without branches to the height of 20 ft.; but the head is stag-horned and much decayed. At Hopetoun House is a growing tree, 75 ft. high, with a trunk 11 ft. in circumference. At Melville Castle is an oak, 70 ft. high, with a trunk 18 ft. in girt at 4 ft. from the ground, and a head 90 ft. in diameter. — South of Edinburgh. In Ayrshire, at Kilkerran, it is 50 ft. high; the girt of the trunk is 12 ft. 6 in., and the diameter of the head is 90 ft. In Haddingtonshire, at Yester, is an oak 89 ft. high, with a trunk 12 ft. in girt, and a head 70 ft. in diameter. In Renfrewshire, at Bothwell Castle, is an oak 59 ft. high, with a trunk 14 ft. in circumference, and a head 98 ft. in diameter. In Roxburghshire, at Minto, are several oaks, about 200 years old, which are 70 ft. high; the girt of the trunk about 12 ft., and the diameter of the head 63 ft. For other remarkable trees in this county, see p. 1772. — North of Edinburgh. In Aberdeenshire, at Fintray House, are four oaks, with trunks varying from 5 ft. 6 in. to 5 ft. 10 in. in circumference. The oak does not ripen its acorns, and rarely its young wood, in this county. In Banffshire, at Gordon Castle, is an oak 66 ft. high, with a trunk about 10 ft. in girt, and a head 66 ft. in diameter. In Cromarty, at Coul, there is an oak 162 years old, which is 80 ft. high; the circumference of the trunk 12 ft., and diameter of the head 60 ft. In Fifeshire, at Danibristle Park, it is 70 ft. high, with a trunk about 11 ft. in girt, and 40 ft. clear of branches; diameter of the head 45 ft. At Largs is an oak 100 ft. high, with a trunk 9 ft. 6 in. in circumference, and 35 ft. clear of branches; and a head 53 ft. in diameter. In Forfarshire there is an oak, on the estate of Lord Gray, at Gray House, which was 68 ft. high, the circumference of the trunk 17 ft. 6 in., and the diameter of the head 90 ft., when it was measured, in June, 1836, by Mr. Robertson, His Lordship's gardener. The same oak, when measured in 1821, was, we are informed by Mr. Robertson, then only 16 ft. in circumference; and, consequently, it has gained 18 in. since that period: it is *Q. pedunculàta*, and is in great health and vigour. In Perthshire, at Taymouth, is a growing oak, 45 ft. high, with a trunk 14 ft. in girt, and a head 72 ft. in diameter. The tree stands in the park, in a loamy soil on a dry subsoil, and is about 100 years old. In Ross-shire, at Brahan Castle, is an old oak, 80 ft. high, with a long straight trunk 12 ft. in circumference, and a head 90 ft. in diameter. In Stirlingshire, at Blair Drummond, is a growing oak, 120 years old, 86 ft. high, with a trunk 20 ft. in the bole, and 14 ft. in circumference; diameter of the head 60 ft. There are many fine oaks at Blair Drummond, from 15 ft. to 50 ft. in the bole, but no other is quite so much in circumference. In Callender Park, *Q. sessiliflòra* is 50 ft. high, the circumference of the trunk 15 ft. 6 in., and diameter of the head 58 ft. In Sutherland, at Dunrobin Castle, is an oak 80 ft. high, the diameter of the head 47 ft., and the girt of the trunk about 11 ft.

The British Oak in Ireland. Near Dublin, at Cypress Grove, it is 50 ft. high; girt of the trunk 7 ft., and the diameter of the head 50 ft. — South of Dublin. In the county of Carlow, at Oak Park, the seat of Colonel Bruen, is an oak 56 ft. high, with a trunk 23 ft. in girt, and a head 90 ft. in diameter; also another, at Garry Hudon, 76 ft. high, diameter of the head 85 ft., and girt of the trunk 22 ft.: both are single trees, growing in a loamy soil. At Borris House it is 61 ft. high, with a trunk 12 ft. 6 in. in girt, and a head 83 ft. in diameter. In the county of Cork, at Moor Park, the seat of the Earl of Mount Cashel, *Q. pedunculàta* is 76 ft. high, girt of the trunk 18 ft., and diameter of the head 65 ft.; and *Q. sessiliflòra* is 96 ft. high, with a trunk 24 ft. in circumference, and a head 85 ft. 6 in. in diameter. In King's County, at Charleville Forest, it is 110 ft. high, the girt of the trunk 18 ft., and diameter of the head 128 ft. This noble tree grows on the lawn, in a brown loamy soil on a calcareous gravelly subsoil: it is a young tree in a growing state. Another is 85 ft. high, with a clear trunk 28 ft. high, and averaging 16 ft. in circumference; diameter of the head 102 ft. At 28 ft. from the ground, the tree divides into 11 large arms, which rise nearly in a perpendicular direction; and from these spring 135 smaller arms, or branches, some of which droop within 4 ft. of the ground. A beautifully spreading oak, in the same forest, is only 56 ft. high, with a trunk 16 ft. in circumference, and a head 115 ft. in diameter. This tree begins to throw out branches, or rather large horizontal limbs, at 2 ft. from the ground, terminating in a kind of sugarloaf head. There are many other fine oaks in Charleville Forest, but these are the most remarkable. In Kilkenny, at Mount Juliet, the seat of the Earl of Carrick, it is 60 ft. high, with a trunk 25 ft. clear of branches, but only 7 ft. in circumference. — North of Dublin. In the county of Antrim, at Belvoir Park, near Belfast, stands

what is probably the largest oak in Ireland; since it measures 28 ft. in circumference at 6 ft. from the ground. It is much decayed, and has lost much of its height and many branches. At Shane's Castle, the seat of Earl O'Neill, *Q.* pedunculàta is 65 ft. high, with a trunk 15 ft. in girt at 4 ft. from the ground, and a head 84 ft. in diameter; and *Q.* sessiliflòra is 68 ft. high, 16 ft. 6 in. in girt, and the head 90 ft. in diameter. Both are young trees in a healthy growing state; and *Q.* sessiliflòra, in particular, in the years 1835 and 1836, made a general growth throughout its branches of from 9 in. to 1 ft. 8 in. In the county of Down, at Hillsborough Castle, it is 70 ft. high, with a trunk nearly 22 ft. in circumference, and clear of branches to the height of 25 ft.; at Moira, it is 60 ft. high, with a trunk about 16 ft. in circumference, and a head 68 ft. in diameter. In Fermanagh, at Florence Court, it is 70 ft. high; girt of the trunk 15 ft. and diameter of the head 80 ft.: at Castle Coote, a young oak is 75 ft. high, with a trunk 12 ft. 8 in. in girt, it is a thriving tree; another, much shattered by lightning, is 90 ft. high, with a trunk 10 ft. 6 in. in circumference. In Louth, at Dundalk, is an oak 60 ft. high; circumference of the trunk, at 1 ft. from the ground, 15 ft.; at 19 ft., 10 ft.; diameter of the head 84 ft. In the county of Sligo the oaks are small, but remarkable for the closeness and fineness of the grain of their timber. One at Mackree Castle is 30 ft. high, with a trunk about 7 ft. in circumference, and a head 75 ft. in diameter. In Westmeath, at Pakenham Hall, the seat of the Earl of Longford, *Q.* pedunculàta is 80 ft. high, with a trunk perfectly clear from knots or branches for 31 ft.; girting 12 ft. at 1 ft. from the ground, and 6 ft. at 31 ft., just below the swelling of the branches. The trunk is perfectly straight, and the tree, which is in a healthy and growing state, is about 96 years old.

The British Oak in Foreign Countries. In France, at Toulon, in the Botanic Garden, 48 years planted, it is 60 ft. high; the girt of the trunk 12 ft. In Brittany, at Barres, on the estate of M. Vilmorin, 9 years planted, it is 15 ft. high. In the Botanic Garden at Avranches, *Q.* sessilifòlia, 40 years planted, is 39 ft. high; the circumference of the trunk 8 ft., and the diameter of the head 28 ft. In Saxony, at Wörlitz, *Q.* sessilifòlia, 330 years old, is 70 ft. high, with a trunk 27 ft. in circumference. In the Grand-Duchy of Nassau, near Weisbaden, is a very remarkable weeping oak, of which we have been furnished with a sketch (from which our *fig.* 1695. is reduced), by the Honourable Mrs. Wrightson, of Warnsworth Hall, near Doncaster, daughter of Lord Walsingham:—"It is a large handsome tree, the great peculiarity of which is, that all the lower branches are very long, slender, and pendulous, more like those of a weeping birch than of oaks in general. It is a solitary tree, with no other oaks near it; and it stands on grass by the side of the road. There is a legend attached to the tree, that two lovers, while taking shelter under it, were struck by lightning, and that the tree has wept ever since." In Bavaria, at Munich, in the English Garden, 200 years old, it is 40 ft. high, circumference of the trunk 7 ft. 6 in., and diameter of the head 40 ft.; in the Botanic Garden, another (*Q.* pedunculàta), 84 years old, is 20 ft. high, and the girt of the trunk 24 in.; and *Q.* sessiliflòra, also 84 years old, is 18 ft. high, and the circumference of the trunk 1 ft. 6 in. In Austria, near Vienna, at Brück on the Leytha, 180 years old, it is 84 ft. high, with a trunk 15 ft. in circumference, and a head 80 ft. in diameter. In Prussia, at Berlin, in the Pfauen Insel, 100 years old, it is 80 ft. high, with a trunk 12 ft. in circumference, and a head 36 ft. in diameter. In Sweden, at Lund, in the Botanic Garden, it is 56 ft. high; the circumference of the trunk 4 ft. 6 in., and the diameter of the head 36 ft. In Russia, in the Government Garden at Odessa, 12 years planted, *Q.* sessiliflòra is 16 ft. high, and the girt of the trunk 15 in.; and *Q.* pedunculàta is 17 ft. high, girt of the trunk 12 in. In Italy, in Lombardy, at Monza, 50 years old, *Q.* sessiliflòra is 65 ft. high, the circumference of the trunk 7 ft., and the diameter of the head 44 ft.; and *Q.* pedunculàta is 60 ft. high, girt of the trunk 7 ft., and diameter of the head 40 ft.



1695

Commercial Statistics. Acorns, in London, are from 2*s.* 6*d.* to 3*s.* 6*d.* per bushel. Plants (two-years-old seedlings), 10*s.* per thousand; transplanted, and from 2 ft. to 3 ft. high, 40*s.* per thousand. At Bollwyller, acorns of the species are from 2 to 3 francs per bushel; and plants of the varieties are from 1 franc to 3 francs each. At New York plants are 50 cents each.

♀ 3. Q. PYRENA'ICA *Willd.* The Pyrenean Oak.

Identification. Willd., No. 67.; N. Du Ham., 7. p. 179.; Rees's Cycl., No. 75.
Synonymes. *Q. Taúzin* Pers. Syn., 2. p. 571.; *Q.* nìgra *Thore Chlor. Land.*, 381.; *Q. Tòza* Bosc Journ. Hist. Nat., 2. p. 155.; *Q.* stolonífera *Lapeyr. Pl. Pyr.*, 582.; Chêne noir *Secondat.*
Engravings. Secondat Mém. du Chêne, t. 2. and t. 5.; N. Du Ham., 7. t. 56.; Bosc Journ. Hist. Nat., 2. t. 32. f. 3.; and our *fig.* 1696.

Spec. Char., &c. Leaves oblong, pinnatifid, stalked; downy beneath; somewhat heart-shaped and unequal at the base; lobes obtuse, slightly toothed. Fruit stalked. (*Willd.*) A low tree, a native of the Pyrenees. Introduced in 1822. This species forms a smaller tree than *Q.* pedunculàta or *Q.* sessiliflòra; from both of which it is distinguished by its roots, which run chiefly near the surface, and throw up suckers. The trunk seldom attains a greater circumference than from 6 ft. to 9 ft. The bark is dark-coloured and chapped. The leaves are petiolated; and the acorns are borne on short peduncles, generally two together. The tree is readily known, from its infancy upwards, from every other oak, in spring, by the dense covering

of woolly down that is spread over its young leaves, which, on their first appearance (in the climate of London, three weeks later than those of the common oak), are of a reddish tinge. The tree is found, in France, in the Lower Pyrenees, and in every part of the west, as far as Nantes, almost always on poor sandy soil. In the Landes, it is known under the name of chêne noir, tauzin, or tauza. At Angers, and at Nantes, it is called chêne doux; at Mons, chêne brosse; and among the nurserymen in these countries, chêne Angoumois. The Basques call it amenza, or ametça. Bosc says that there is a plantation of it in the Park of Daumont, at the back of the Forest of Montmorency, some of the trees in which ripen acorns annually; and that he had sown a great many of them in the government nurseries at Versailles. Secondat, who appears to have been the first to bring this species of oak into notice, considers it as the true Quércus Ròbur of the ancients, as already noticed, p. 1722. He says that this oak grows well in the poorest soil, in which its roots extend close under the surface to a great distance, here and there throwing up suckers. The wood is of great hardness, toughness, and durability; and it is chiefly used for the construction of wine casks. Bosc adds that the wood weighs 60 lb. per cubic foot, and that it is very apt to warp; but that the bark furnishes the best of all tar. In the *Journal d'Hist. Nat.*, tom. ii. pl. 32., he has figured a gall fly (Diplólepis umbráculus *Oliv.*, Cýnips quércûs tòjæ *Fab.*), and the gall produced by it, peculiar to this tree. The gall (*fig.* 1697.) is spheroidal, fungous within, and



1696

1697



almost ligneous without; smooth, but crowned with from 8 to 12 tubercles, separated by indentations. The gall fly resembles the Cýnips glechòmæ *Lin.*; but differs from that species in having the abdomen as downy as the thorax. In the *Nouveau Dict. d'Agric.*, it is said that, in the Landes, the acorns of the *Q. Taúzin* are much more sought after for feeding swine, than those of *Q.* sessiliflòra or *Q.* pedunculàta. The young shoots of *Q.* pyrenàica are more flexible than those of *Q.* sessiliflòra and *Q.* pedunculàta, and, consequently, make better hoops. The leaves and young shoots are much more bitter than those of the other species, and are often rejected by cows

and sheep; while those of the common species, in the same pasture, are eaten. The wood makes excellent fuel. There are plants in the Horticultural Society's Garden, which, in spring, when their leaves are expanding, are of very great beauty and singularity; and the species, on that account, well deserves culture as an ornamental tree. There are some small trees, in the Horticultural Society's Garden, 6 ft. or 8 ft. high. In France, in Brittany, at Barres, 8 years planted, it is 10 ft. high. In Germany, at Brück on the Leytha, near Vienna, 15 years from the acorn, it is 6 ft. high. In Italy, at Monza, 16 years planted, it is 14 ft. high. There are some plants at Messrs. Loddiges's; and, in the catalogue of the Kensington Nursery for 1834, seedling plants are marked at 50*s*. per thousand. At present we are not aware of plants being in any nursery, except a few at Messrs. Loddiges's; but acorns may be had from Paris or Bourdeaux in abundance; and there is scarcely a species of the genus more deserving of culture, for the beauty of its spring foliage.

Varieties. In the *Nouveau Du Hamel* three are mentioned: — 1. With large acorns, on peduncles, axillary and terminal; 2. With axillary acorns of a middle size; and, 3. With small acorns, on long racemes. Desvaux, in the *Journal de Botanique* for 1808, mentions *Q. Taúzin* laciniàta, having jagged leaves; and *Q. T.* digitàta, having digitate leaves. Bosc speaks of a dried specimen in his possession, which he thinks may belong to the true chêne Angoumois; which, he says, is often confounded with *Q. Taúzin* and *Q.* Cérris. To this specimen he has given the name of *Q.* Lígeris, or chêne ligérien. In the London Horticultural Society's Garden there is an oak which was received from M. Schammes of Pesth, in Hungary, under the name of *Q.* conférta, which appears to belong to *Q.* pyrenàica; but, not having seen the fruit, we cannot be quite certain of this.

♆ 4. *Q.* APENNI'NA *Lam.* The Apennine Oak.

Identification. Lam. Dict. Encycl., 1. p. 725.; N. Du Ham., 7. p. 177.; Bosc Mém. sur les Chênes.
Synonymes. *Q.* conglomeràta *Pers.*; Chêne hivernal, *Fr.*
Engravings. N. Du Ham., 7. t. 53.; and our *fig.* 1698.

Spec. Char., &c. Leaves oval-oblong, petiolated, sinuated, pubescent beneath, bordered with obtuse lobes, somewhat angular. Acorns oval, disposed along a short peduncle. (*Lam.*) The leaves are exceedingly woolly beneath; the acorns small, almost globular, and sometimes borne to the number of 8 or 10 on one peduncle, not above 1 in. in length. The tree does not attain a large size, seldom exceeding the height of 20 ft. According to the *Nouveau Du Hamel*, it is intermediate between *Q.* sessiliflòra pubéscens and *Q.* pedunculàta. Bosc says it is very distinct from *Q.* pedunculàta, and from every other species of *Quércus.* He found it in abundance, he says, on the mountains in the neighbourhood of Lyons; and it is also indigenous to Italy and to the Levant. It is always found in dry places, on sandy or stony soils. There are plants in Paris and at Versailles, and in the Bois de Boulogne. The name is in British catalogues; but no year is given for its introduction, nor have we ever seen or heard of a plant of it. Acorns might, doubtless, be obtained through M. Vilmorin; and, being of small size, it would appear to be a most desirable tree for a suburban garden, or to represent the European division of the genus *Quércus* in a miniature arboretum.



1698

♆ 5. *Q. E'*SCULUS *L.* The Esculus, *or Italian*, Oak.

Identification. Lin. Sp. Pl., 1414.; Willd., No. 63.; Ait., No. 22.; N. Du Ham., 7. p. 176.; Rees's Cycl., No. 70.
Synonymes. Phàgus *E'*sculus, mas et fœm, *Dalech. Hist.*, 5.; Chêne grec, *Fr.*
Derivation. From *esca*, food. The *E'*sculus of the classics is by some taken for the beech tree; but the *Q. Æ'*sculus of Linnæus is now believed to be the *Ph*àgos of Theophrastus, which he expressly says is a kind of oak.
Engravings. Our *figs.* 1699. and 1700.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves ovate-oblong, sinuated, smooth; paler beneath; segments bluntish, somewhat angular at the base. Fruit nearly sessile. Calyx scaly, hemispherical. (*Smith.*) A native of the south of Europe; from 20 ft. to 30 ft. high. Cultivated by Miller, in 1739; and flowering in May. Acorns have been produced on the trees of *Q. E'*sculus in the Hor-

ticultural Society's Garden. "So little attention," says Sir J. E. Smith, "has been paid to this species by botanical writers, that we can find no certain description or figure of it, except in Dalechamp's *Hist. Plant.* We even doubt whether the plant intended in the first edition of the *Hortus Kewensis* be the true one; yet this seems what Willdenow describes as such. What Linnæus briefly describes, in his *Mantissa* (496.), under the name of *Æ'sculus*, seems to be *Q. Cérris*; with which latter the description copied by Willdenow, and the specific character extracted therefrom, well agree; but not at all with the original and authentic specimen of *Q Æ'sculus* in the Linnæan herbarium." (*Rees's Cycl.*) Sir James next describes the Linnæan specimens; and his descriptions agree remarkably well with the trees bearing this name in the Horticultural Society's Garden: — "The branches angular, furrowed, and smooth. Leaves scattered, aggregate at the top from 2 in. to 3 in. long, and 1½ in. at most in breadth. Footstalks nearly 1 in. long; destitute of the long, linear, tufted, stipulaceous scales, or ramenta, found in *Q. Cérris*, *Q. Æ'gilops*, and *Q. austrìaca*. Young acorns axillary, nearly sessile, solitary, or in pairs; the cup scaly; the size of small peas. Dalechamp represents the full-grown acorns as about 1 in. long, embraced by a hemispherical scaly cup, about one third that length. He says that they are sweet and eatable; and that they are brought to table roasted by the Spaniards, as well as by the rustic Italians; but that they are sometimes found to affect the head like darnel." (*Ibid.*) It is singular, that very little is known respecting this tree even in France. Bosc says that it is cultivated in the garden of the Museum; but that, as far as he knew, it had never produced fruit. The tree in the Horticultural Society's Garden, which is upwards of 20 ft. high, has produced fruit three or four seasons. The tree in the Hackney arboretum has also, we believe, produced fruit. *Figs.* 1699. and 1700. are sprigs taken from the tree in the Horticultural Society's Garden. Plants, in the London nurseries, are 3*s.* 6*d.* each.

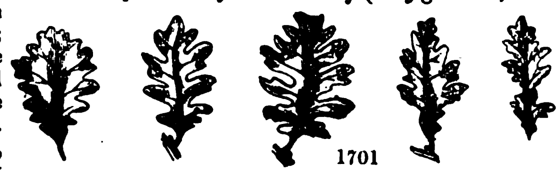


1699



1700

Varieties. The leaves of this species vary considerably (see *fig.* 1701., all of which grew on the same tree); and, if it were desirable, several varieties might be selected from a bed of seedlings, and continued by grafting. There is a tree in the Fulham Nursery with decidedly pendulous shoots, which, being a free grower, forms a very ornamental object.



1701

Statistics. In the environs of London, at Ham House, it is 15 ft. high; the diameter of the head 22 ft., and of the trunk 11 in. In Staffordshire, at Trentham, it is 26 ft. high; the diameter of the head 23 ft., and of the trunk 13 in. In Ireland, in the Glasnevin Botanic Garden, 35 years planted, it is 30 ft. high; the diameter of the head 18 ft., and of the trunk 1 ft. In Germany, at Brück on the Leytha, 44 years planted, it is 34 ft. high; the diameter of the head 15 ft., and of the trunk 9 in.

§ ii. *Cérris.* *Mossy-cupped, or Turkey, Oaks.*

Sect. Char. Leaves lobed and sinuated, or dentated; more or less persistent; in some varieties, subevergreen, or evergreen; always dying off of a dirty white, or paper brown; never with any tinge of red or yellow. Buds furnished with linear stipules. Fructification generally biennial. Cups echinate, ramentaceous, or scaly, squarrose.

♀ 6. Q. CE'RRIS *L.* The *bitter, or mossy-cupped,* Oak.

Identification. Lin. Sp. Pl., 1415.; Willd., No. 75., Baumzucht, p. 350.; Ait., No. 28. γ.; N. Du Ham., 7. p. 182.; Rees's Cycl., No. 83.

Synonymes. Q. crinita α and β, *Lam. Dict.*, 1. p. 718.; Q. *Haliphlœ'os Juss.* in *Hort. Par.*; Q. burgundiaca, &c., *Bauh. Pin.*, 420.; Q. Cérris Plinii, &c., *Lob. Icon.*, 2. 156., *Dod. Pempt.*, 831., *Ger. Emac.*, 1345.; Cérrus *Dalech. Hist.*, vol. 1. p. 6.; the Turkey Oak; the Iron, or Wainscot, Oak: Chène Cerris, Chène chevelu, Chène de Bourgogne, *Fr.*; Burgundische Eiche, Cerr-eiche, *Ger.*

Derivation. The specific appellation Haliphlœos was applied by Pliny to an oak with very bitter acorns: but it may be derived from *halis*, enough, and *phloios*, bark; in reference to the tendency to corkiness in the bark. The Iron Oak alludes to the weight of its wood, which is much heavier than that of the common oak. The term Wainscot Oak refers to its suitableness for lining the walls of rooms, from the Dutch words, *ward*, a wall; and *schorten*, to suspend.

Engravings. N. Du Ham., 7. t. 57.; our *fig.* 1702.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves on very short stalks, oblong, deeply and unequally pinnatifid; hairy beneath; lobes lanceolate, acute, somewhat angular. Stipules longer than the footstalks. Calyx of the fruit hemispherical, bristly. (*Smith.*) A tree attaining the same height as the British oak, but of much more rapid and vigorous growth. A native of France, Italy, Spain, Austria, and the Levant. Introduced into Britain in 1735, and not uncommon in plantations. It flowers in April, and ripens its acorns, in the climate of London, in October of the second year, and sometimes in the autumn of the first year.



1702



1703

Varieties. There is a great tendency in this species to sport; so that many varieties may be selected from every bed of seedlings. It also appears to hybridise with facility, especially with Q. Sùber; and from this cross the numerous race of varieties known as the Lucombe, or Exeter, oaks have been raised. There are also some varieties of Q. Cérris which appear to owe their origin to geographical circumstances; such as Q. C. austrìaca, and Q. C. crinìta. The varieties cultivated in British nurseries may, for practical purposes, be arranged as deciduous, subevergreen, and evergreen.

* *Foliage deciduous.*

a. *Leaves pinnatifid or sinuated. Cups of the Acorns mossy.*



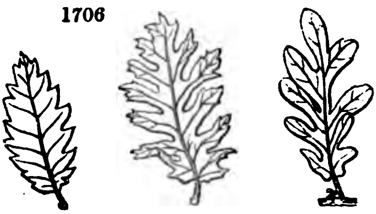
1704

♈ Q. C. 1 *vulgàris*, *Q. C.* frondòsa *Mill. Dict.*, ed. 5. (see *fig.* 1702., and the plates of this tree in our last Volume), has the leaves pinnatifidly sinuated, and the cups covered with soft moss. Of this variety there is an endless number of subvarieties. *Fig.* 1702. may be considered as the normal form: *fig.* 1704. has the leaves more deeply sinuated: *fig.* 1703. is from a specimen of great beauty, sent us by Thomas Brooks, Esq., of Flitwick House: and *fig.* 1705., copied from the figure given in Olivier's *Travels*, is the *Q.* crinìta var. ε, *Lam. Dict.*, i. p. 718., *Smith* in *Rees's Cycl.*, No. 82.; *Q.* Tournefórtii Willd., No. 74., N. Du Ham., vii. p. 183.; *Q.* orientàlis latifòlia, &c., *Tourn. Cor.*, 40., *Voy.*, ii. p. 172.; *Q.* Cérris *Oliv. Voy.*, i. p. 221., Eng. ed., ii. p. 5. and t. 12.; and *Q. H*aliphlœ'os *Bosc Mém. sur les Chênes.* This oak was originally gathered by Tournefort in valleys and plains near Tocat, in Armenia. Olivier says it is met with throughout great part of Asia Minor and Syria. The timber is brought to the arsenal of Constantinople from the southern shores of the Black Sea, and is commonly employed in ship-building, and also for the framework of houses. The tree grows to a considerable height, and furnishes excellent wood. In British plantations, it is one of the most ordinary forms in which the species rises from seed. From the acorns of any one of these subvarieties, all the others, and many more, will seldom fail to be produced in the same seed-bed, and, indeed, sometimes on the same tree, or even on the same twig. *Fig.* 1706. shows portraits of three leaves, taken from a specimen of *Q.* Cérris vulgàris, gathered in the arboretum at Milford, in 1835, and there erroneously named *Q.* lusitánica. We have observed a similar diversity of appearance in the leaves of an old tree of *Q.* Cérris in the grounds at Buckingham Palace.



1705

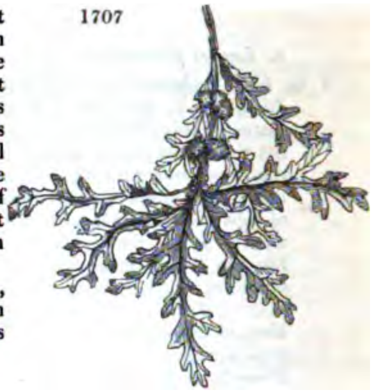
1706



♈ Q. C. 2 *péndula* Neill in Lauder's Gilpin, vol. i. p. 73. The pendulous, or weeping, Turkey Oak. — There is a specimen of this variety in the experimental garden of the Caledonian Horticultural Society, which was procured from the Botanic Garden, Amsterdam; but the handsomest tree of the kind in Britain, or perhaps in Europe, is probably that at Hackwood Park, from a specimen of which *fig.* 1707. was taken. This tree, which was planted in 1800, was, in 1836, nearly 40 ft. high, with a trunk clear of branches to the height of 8 ft. 9 in., which, at the surface of the ground, was 2 ft. 9½ in. in circumference. The branches not only droop to the ground, but, after touching it, they creep along the surface to some distance, like those of *Sophòra*

japónica péndula. The largest branch is about 17 ft. in length to where it touches the ground, and it extends about 4 ft. or 5 ft. more along its surface. This variety seems remarkably distinct, and well deserving of culture. The tree produces acorns, some of which have been kindly sent to us by Lady Bolton, which we have distributed.

1707

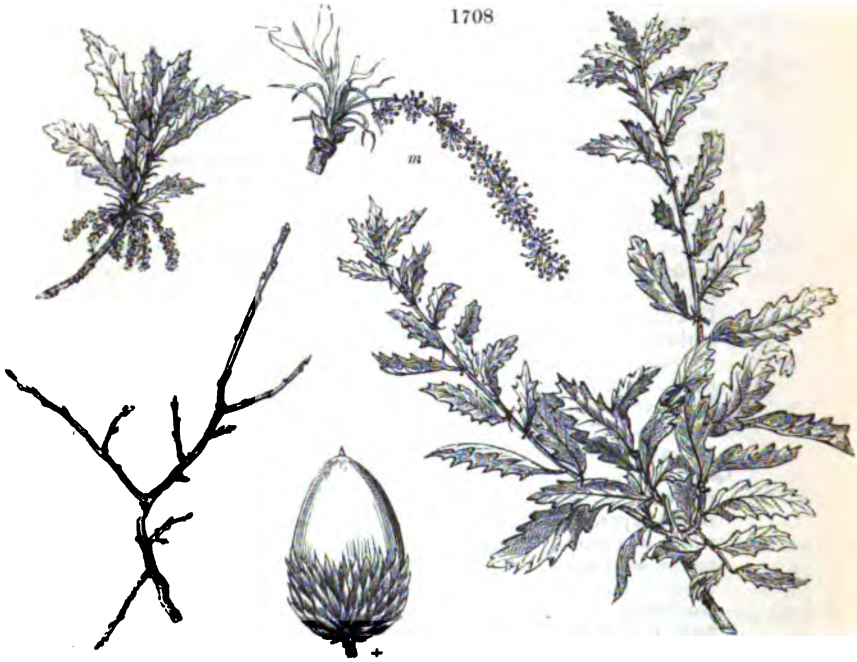


₮ Q. C. 3 *variegàta* Lodd. Cat., ed. 1836, only differs from the species in having the leaves variegated.

b. *Leaves dentate. Cups of the Acorns bristly.*

₮ Q. C. 4 *austrìaca ; Q.* austriàca *Willd.*, No. 76., *N. Du Ham.*, vii. p. 183., *Rees's Cycl.*, No. 84.; *Q.* Cérris *Host Syn.*, 520. *a* and *β*. No. 28.; *Q.* crinìta *γ* Cérris *Lin.*, *Lam. Dict.*, i. p. 718.; *Q.* cályce híspido, &c., *Bauh. Pin.*, 420.; Cérrus *Clus. Hist.*, i. p. 20.; Cérri minòris rámulus cum flòre *Ger. Emac.*, 1346, with Clusius's figure; Cérris Plínii minòre glánde *Lob. Ic.*, ii. p. 156., *Ger. Emac.*, 1345.; Æ'gilops minòre glánde *Dod. Pempt.*, 831.; Haliphlœ'os, Cérrus fœ'mina *Dalech. Hist.*, i. p. 7.; our *fig.* 1708.; and the plate of this tree in our

1708



last Volume. — Leaves on longish stalks, ovate-oblong, slightly, but copiously, sinuated; downy and hoary beneath; lobes short, ovate,

acute, entire. Stipules shorter than the footstalks. Calyx of the fruit hemispherical, bristly. (*Smith.*) Sir J. E. Smith observes that this tree is "generally mistaken for *Q. Cérris*, from which nothing can be more certainly distinct;" we admit their distinctness, but no one who has seen the two trees together in the Horticultural Society's Garden can, we think, doubt their being only different forms of the same species. This variety is a native of Austria, Hungary, Carniola, Italy, and other parts of the south of Europe, in stony mountainous places. It forms the common oak of the indigenous woods in the neighbourhood of Vienna, where it is considered by M. Rosenthal, an excellent practical botanist, as nothing more than a variety of *Q. Cérris*. The tree from which our portrait is taken is in the arboretum of the London Horticultural Society. In the University Botanic Garden at Vienna there is a tree, 60 years planted, which is 40 ft. high.



1709

♈ Q. C. 5 *càna màjor; Q.* cana major *Lodd. Cat.*, ed. 1836 (*fig.* 1609.); the hoary-leaved bitter, or Turkey, Oak; resembles *Q.* austriaca in the form of its leaves; but they are much more downy beneath. There is a vigorous-growing handsome tree of this variety in the arboretum of Messrs. Loddiges, which, in 1836, was 35 ft. high. The name càna (hoary) was originally given to this variety in the Hammersmith Nursery, but whence the tree was obtained is uncertain.

♈ Q. C. 6 *càna mìnor, Q.* càna minor *Lodd. Cat.*, ed. 1836, resembles the preceding kind, but has narrower leaves. There is a tree at Messrs. Loddiges's, 25 ft. high.

♈ Q. C. 7 *Rágnal; Q.* Rágnal *Lodd. Cat.*, ed. 1836. The Ragnal Oak. — This variety has rather narrower and more deeply cut leaves than *Q. C.* càna màjor; but, in other respects, scarcely differs from that variety. It is a tree of remarkably vigorous growth; but we have only seen one plant, which is in the arboretum of Messrs. Loddiges. Miller mentions a large tree of this variety growing at Ragnal, near Tuxford, in Nottinghamshire, "which makes a most elegant appearance; the leaves being shaped like those of the common oak, but ash-coloured underneath, which renders it very beautiful. It produces acorns, some years, in great plenty; but, unless the autumns prove favourable, they do not ripen so as to grow." (*Mill. Dict.*, ed. 3., App., No. 12.) We have written to a number of persons in Nottinghamshire respecting the Ragnal Oak; and we find that the tree was cut down upwards of 50 years ago, but what became of the timber is unknown. There are trees bearing the name of the Ragnal oak in the plantations at Welbeck Abbey, of which His Grace the Duke of Portland has kindly sent us specimens; but, as the plants have probably been seedlings, they are very different in foliage from the tree bearing the same name at Messrs. Loddiges's. There was a tree of the Ragnal oak for many years in the Fulham Nursery; but the late Mr. Whitley, a very short time before his death in 1835, told Mr. Osborne, jun., that it had died a few years before. Judging from the trees at Messrs. Loddiges's, we have no hesitation in saying that *Q. C.* càna màjor and mìnor, and *Q. C.* Rágnal, are merely slight variations of the same form. They all differ, however, from the Fulham oak, and from what is called the old Lucombe oak, in not being in the slightest degree sub-

evergreen; though the leaves, after withering, generally remain on the tree through a great part of the winter. However slight the difference may be between these subvarieties, those who collect oaks cannot do wrong in procuring plants of each of them; all of them forming trees of free growth, and of very great beauty, as may be seen by the speimens referred to in the arboretum of Messrs. Loddiges.

** *Foliage subevergreen. Leaves dentate. Acorns with bristly Cups.*

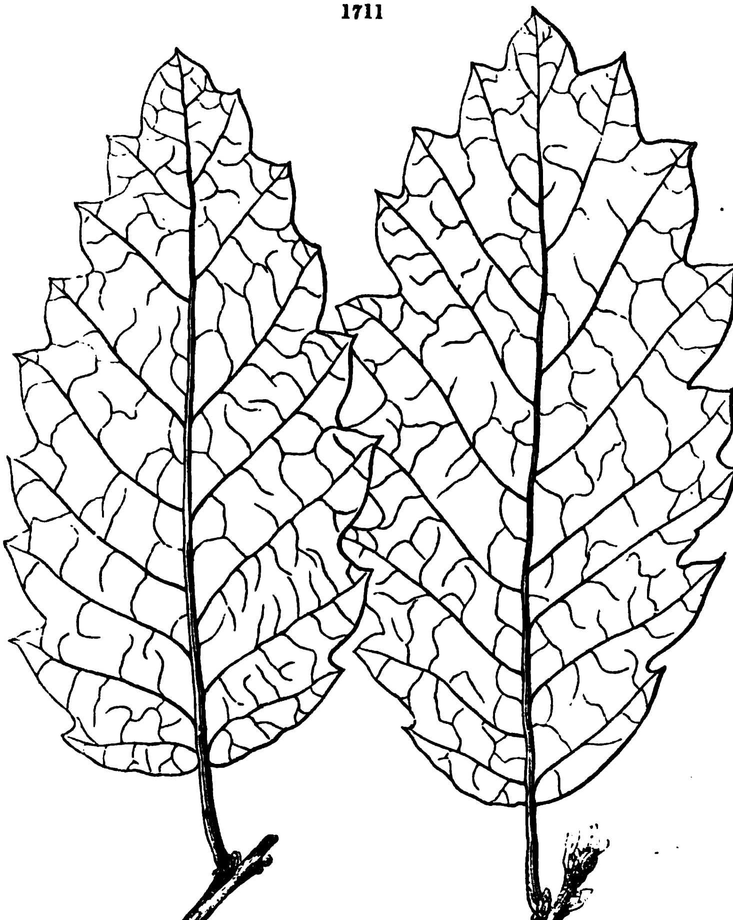
The leaves remain on the tree through a great part of the winter, retaining their vitality and greenness. In mild winters, the leaves do not begin to drop till March or April; and even in severe winters, a part of them, on the sheltered side of the tree, continue green till near the end of that month.

¥ Q. C. 8 *fulhaménsis*; *Q. C.* dentàta *Wats. Dend. Brit.*, t. 93.; *Q. C.* hýbrida var. dentàta *Swt.* The Fulham Oak. See *fig.* 1710., and the plates of this tree in our last Volume. — Leaves alternate, ovate-elliptic, largely dentated; the dents obtuse-angular, their sides excurved, and their vertices shortly mucronate. (*Wats.*) This is a fine broad-leaved subevergreen variety, of which there is a magnificent specimen in the Fulham Nursery. The plates of the Fulham oak in our last Volume are portraits of this tree; the one taken in November, 1836, and the other on May 1. 1837. It is 75 ft. high; the diameter of the space covered by the branches 54 ft., and the diameter of the trunk, at 3 ft. from the ground, 3 ft. 10 in. There is a tree of the same variety at Mamhead, near Exeter, planted by Mr. Lucombe (the originator of the Lucombe oak, and the grandfather of the present Mr. Pince of the Exeter Nursery), when he was gardener at Mamhead, which is 80 ft. high, with a trunk 4 ft. 6 in. in diameter at 1 ft. from the ground. (See *Gard. Mag.*, vol. xi. p. 128.) There is a great similarity between the foliage of this tree and that of the Fulham oak, as will be seen by *fig.* 1711.; in which the right-hand figure is a fac-simile outline, of the natural size, of a leaf of the Fulham oak; and the left-hand figure is the outline of a leaf of the Exeter, or old Lucombe, oak, also of the natural size. But, however alike the trees may be in foliage, they are very different in their habits of growth; the Fulham oak being a branching tree, with a round head, and a comparatively smooth, though still somewhat corky, bark; and the old Lucombe oak growing with a straight erect trunk, regularly furnished with branches, and forming, both in its young and old states, a conical spiry-topped tree, with a more rough and corky bark than the other. In the Fulham Nursery there is a full-grown tree of the old Lucombe oak, as well as one of the Fulham oak, of both of which portraits are given in our last Volume, which strongly display the characteristic difference between the two trees. The age and origin of the Fulham oak are unknown; but Mr. Smithers, an old man who has been employed in the Fulham Nursery from his youth, and who remembers the tree above 45 years, says that it always went by the name of the Fulham oak, and that he understood it to have been raised there from seed. We have examined the tree at its collar, and down to its main roots, several feet under ground; and, from the uniform texture, and thick corky character of the bark, we feel satisfied that it is not a grafted tree. In fine seasons, this variety produces abundance of acorns, from which many



1710

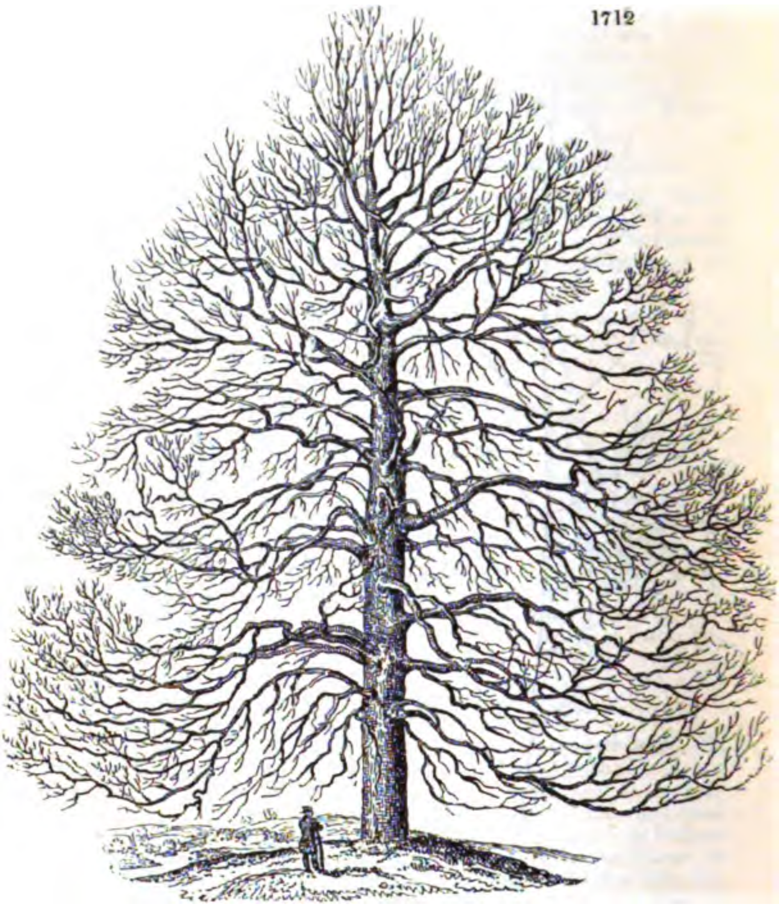
1711



plants have been raised. These plants, though they have the leaves more frequently broad and dentate, than narrow and sinuate, or pinnatifid, yet vary so exceedingly, that they could hardly be sold as the genuine Fulham oak. Hence, that variety can only be propagated by grafting; and the stock ordinarily used is the common oak, on which the Fulham oak takes as freely as the apple does on the crab. Messrs. Osborne have lately selected a seedling with leaves broader and less dentate than usual; and this they are now propagating under the name of *Q. C.* fulhaménsis latifòlia. We prefer the designation of *Q. C.* fulhaménsis to Watson's name of *Q. C.* dentàta; because the latter will apply equally to several varieties, and is as characteristic of the Lucombe oak as of the Fulham oak.

‡ Q. C. 9 *Lucombeàna*; *Q.* Lucombe*àna* Swt.; *Q.* exoniénsis *Lodd. Cat.*, ed. 1836. The Lucombe Oak, the evergreen Turkey Oak, the Devonshire Oak, the Exeter Oak. (*fig.* 1714., and *figs.* 1712, 1713.) —

1712



Quércus Cérris Lucombeàna, in its deciduous state, in the Exeter Nursery.
Height 75 ft.; diameter of trunk 6 ft.; diameter of the head 65 ft.

This variety is subevergreen: it was raised by Lucombe, nurseryman at Exeter, from seeds of the species, sown about 1762. The acorns had been saved from a tree of Mr. Lucombe's own growth; and, when the plants came up, he observed one amongst them that kept its leaves on throughout the winter, to which he paid particular attention, and propagated some thousands of it by grafting. In an account of this variety published in the 62d volume of the *Philosophical Transactions*, dated 1772, it is described as "a tree, growing as straight and handsome as a fir, with evergreen leaves, and wood in hardness and strength exceeding that of all other oaks. It makes but one shoot in the year, viz. in May; but this continues growing throughout the summer, not being interrupted, about midsummer, by the pause which occurs between the production of the first and the second shoots, in the case of the common oak. The tree grows so rapidly, that the original specimen, at 7 years old, measured 21 ft. high, and 1 ft. 8 in. in circumference: at 6 years old, a grafted tree was 23 ft. high; and a tree 4 years grafted was 16 ft. high." The shoots are, in general, from 4 ft. to 5 ft. in length;

1713



Quércus Cérris Lucombeàna, in full foliage, in the Exeter Nursery.

and the tree, in Devonshire, Cornwall, and Somersetshire, where great numbers of it have been planted, attains the height of from 60 ft. to 80 ft., or upwards, in from 30 to 40 years. Hayes, in 1794, found, by an accurate measurement of a Lucombe oak, made in the 27th year of its growth from the graft, its height to be 60 ft.: its trunk, at 4 ft. from the ground, was 4 ft. 6½ in. in circumference; and, at the place of grafting, 6 ft. in circumference. The "fairness" of the growth of this tree, he says, and the verdure and long continuance of its leaves, are sufficient motives to induce every planter to wish for some plants of it on his demesne: "but the goodness of the timber yet remains to be proved." (*Prac. Treat.*, p. 172., note.) From a specimen of the wood sent to us by Mr. Pince, which we have compared with the wood of the British oak, and also of the Fulham oak, it appears decidedly closer-grained and heavier than that of either. On writing to Messrs. Lucombe and Pince of the Exeter Nursery for the history of the old Lucombe oak, we received the following answer. We may premise that the present Mr. Lucombe is in his 85th year, and that he perfectly recollects his father raising the Lucombe

oak in his own nursery, as described above from the *Philosoph. Transactions*, in 1772. "*Quércus Lucombeàna*," Mr. Pince informs us, "is a hybrid produced between *Q. Sùber* and *Q. Cérris*; the latter species being the female parent. It was raised by the late Mr. Lucombe, who was founder of the Exeter Nursery, from seeds gathered by him off a specimen tree of *Q. Cérris*, which grew in his nursery, near to one of *Q. Sùber*, which accounts for its hybrid origin; the blossom of the Turkey



1714

oak having doubtless been impregnated by the farina of the cork tree. Mr. Lucombe first noticed it about 75 years ago, and extensively propagated and sold it all over the kingdom. When the original tree had attained 20 years' growth, and was about 3 ft. in circumference, Mr. Lucombe, being then far advanced in years, had it cut down, for the purpose of making his coffin out of it. He, however, lived so much longer than be had anticipated, that several years before his death, he had another much larger and older tree cut down, sawn into planks, and carefully deposited under his bed, in readiness for the above purpose; and inside those planks, over which for many years he had reposed, he was at last put to rest, at the advanced age of 102 years. The largest and finest specimens of the old Lucombe oak now existing are growing at Killerton, the beautiful residence of Sir Thomas D. Acland, Bart., near Exeter, where, in 1834, a tree, 80 years planted, was 73 ft. high; diameter of the trunk 3 ft. 5 in., and of the head 62 ft. At Castle Hill, the splendid demesne of Earl Fortescue, near South Molton; and at Carclew, the seat of Sir Charles Lemon, Bart., near Falmouth, in Cornwall; are other very fine trees: one at the latter place, in 1834, 70 years planted, being 82 ft. 4 in. high; diameter of the trunk 3 ft. 3 in., and of the head 40 ft. The old Lucombe oak differs most materially from the Fulham oak; more especially in the general outline of the tree, and its habit of growth, as will be seen by the accompanying sketches. (*figs.* 1712. and 1713.). Its bark is also much more corky than that of the Fulham oak. The old Lucombe oak cannot be propagated, with any degree of certainty (being strictly a hybrid), from acorns, although these are produced rather freely sometimes, and vegetate well; but the produce differs entirely from the parent; and we therefore perpetuate it by grafting it upon stocks of the *Quércus Cérris*, to which it freely unites, and flourishes amazingly; frequently making shoots from 5 ft. to 6 ft. high the first season from grafting. The wood is of a close texture, and beautiful grain. The growth of the tree is rapid, and its whole appearance extremely beautiful. Sketch No. 1., by Mr. Tucker (*fig.* 1712.), represents the old Lu-

combe oak in the Exeter Nursery, as it appears in its deciduous state, from January to May; showing faithfully the stately erect growth of the bole, and the graceful disposition of the branches. This tree has been only 35 years planted: its height is 50 ft.; the circumference of the trunk, at 1 ft. from the ground, is 8 ft. 6 in., and the diameter of the head is 38 ft. Sketch No. 2. (our *fig.* 1713.) represents the same tree in full foliage, as it appears from May to January.—*Robert T. Pince. Exeter, April* 4. 1837."

Statistics. Q. C. *Lucombeàna.* In the environs of London, in the Fulham Nursery, it is 60 ft. 6 in. high; at Syon, it is 65 ft. high, diameter of the trunk 2 ft. 7 in., and of the head 37 ft.; in the Mile End Nursery, it is 45 ft. high, with a trunk 5 ft. 6 in. in girt.—South of London. In Cornwall, at Carclew, near Penryn, it is 82 ft. high, the diameter of the trunk 3 ft., and of the head 40 ft. In Devonshire, at Killerton, 80 years planted, it is 73 ft. high, the diameter of the trunk 3 ft. 6 in., and of the head 62 ft.; at Bystock Park, 24 years planted, it is 40 ft. high; in the Exeter Nursery, 52 years planted, it is 60 ft. high, diameter of the trunk 3 ft. 6 in., and of the head 40 ft. In Dorsetshire, at Melbury Park, 25 years planted, it is 55 ft. high, the diameter of the trunk 3 ft., and of the head 25 ft. In Somersetshire, at Leigh Court, 50 years planted, and 80 ft. high; 14 years planted, it is no less than 50 ft. high, circumference of the trunk 3 ft. 6 in., and diameter of the head 20 ft.: at Nettlecombe, 80 years planted, it is 59 ft. high, the diameter of the trunk 3 ft., and of the head 46 ft.: at Hestercombe, it is 56 ft. high, and the trunk 6 ft. 10 in. in circumference. In Wiltshire, at Wardour Castle, 40 years planted, it is 50 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 54 ft.—North of London. In Berkshire, at White Knights, 26 years planted, it is 27 ft. high, with a trunk 5 ft. in circumference. In Cheshire, at Eaton Hall, 13 years planted, it is 20 ft. high. In Essex, at Audley End, 68 years planted, it is 40 feet high, the circumference of the trunk 6 ft. 6 in., and diameter of the head 51 ft. In Lancashire, at Latham House, 27 years planted, it is 43 ft. high, the diameter of the trunk 13 in., and of the head 32 ft. In Nottinghamshire, at Clumber Park, it is 50 ft. high, the diameter of the trunk 1 ft. 10 in., and that of the head 50 ft. In Oxfordshire, in the Oxford Botanic Garden, 30 years planted, it is 30 ft. high. In Norfolk, at Merton Hall, it is 66 ft. high, the diameter of the trunk 1 ft., and that of the head 46 ft. In Pembrokeshire, at Stackpole Court, 30 years planted, it is 48 ft. high, the diameter of the trunk 1 ft. 6 in., and that of the space covered by the branches 30 ft. In Warwickshire, at Berkswell, 50 years planted, it is 48 ft. high, the diameter of the trunk 3 ft. 9 in., and of the head 22 ft. In Worcestershire, at Croome, 55 years planted, it is 79 ft. high, the diameter of the trunk 2 ft., and of the head 50 ft.; another tree, 30 years planted, is 45 ft. high, the diameter of the trunk is 2 ft., and of the head 30 ft.—In Scotland. In Ayrshire, at Doonside, 40 years planted, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 39 ft. In the Stewartry of Kircudbright, at St. Mary's Isle, it is 49 ft. high, the diameter of the trunk 2 ft., and of the head 36 ft. In Renfrewshire, at Erskine House, 23 years planted, it is 28 ft. high, the diameter of the trunk 7 in. In Cromarty, at Coul, 20 years planted, it is 32 ft. high, the diameter of the trunk 13 in., and of the head 18 ft. In Forfarshire, at Kinnaird Castle, 55 years old, it is 45 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 36 ft. In Perthshire, in Dickson and Turnbull's Nursery, 40 years old, it is 54 ft. high, the diameter of the trunk 2 ft., and that of the head 26 ft.—In Ireland. In the environs of Dublin, at Castletown, 50 ft. high, the diameter of the trunk 2 ft. 6 in., and that of the head 38 ft. In the county of Cork, at Castle Freke, it is 39 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft. In Fermanagh, at Castle Coole, it is 46 ft. high, the diameter of the trunk 2 ft. 6 in., and that of the head 57 ft. In Louth, at Oriel Temple, 60 years planted, it is 67 ft. high, the diameter of the trunk 2 ft., and of the head 46 ft.

*** *Foliage evergreen, or very nearly so. Leaves varying from dentate to sinuate. Cups of the Acorns bristly.*

This section consists entirely of subvarieties of the Lucombe oak, which differ from the parent in being nearly evergreen; and respecting which the following observations have been obligingly sent to us by Mr. Pince:—"These subvarieties were all raised by the present Mr. Lucombe, from acorns gathered from the old Lucombe oak, about 45 years ago (1792). Of the first three of these, there are large specimens in the Exeter Nursery; being the original trees selected by Mr. Lucombe, and from which the plants exposed for sale are propagated. These fine trees," Mr. Pince continues, "which are the admiration of all who visit the Exeter Nursery, differ in many very material respects from their parent, but in nothing so much as being evergreen. There is a peculiarity in these trees, however, as evergreens, which deserves to be noticed. It is, that in the month of May, when the young leaves burst forth, the old ones, which are still quite fresh and green, are entirely and simultaneously cast off, so that the tree appears bare; but so rapid is the change, that a few days suffice to clothe it afresh in full verdure. Therefore, although these varieties are, to a great extent, decidedly evergreen, they cannot strictly come under that denomination. The bark is very corky, and the leaves are of a glossy blackish green

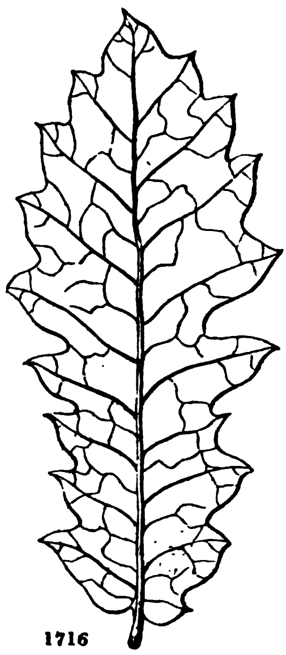
colour. The new evergreen Lucombe oaks are exceedingly rapid in their growth, and very hardy: they are most ornamental trees; and, for producing an immediate and permanent effect in parks, and on lawns, &c., they have no equal. I have seen several instances of their growing vigorously in bleak exposed situations, where the common oak and elm will not succeed: in the vicinity of the sea they grow with great luxuriance; and, in such situations, are equally valuable with the *Q. I'lex*. I send you dimensions and specimens of our large trees of each of the three varieties. We propagate them by grafting, in the same manner as we do the old Lucombe oak. — *Robert T. Pince. Exeter Nursery, April* 4. 1837."

Mr. Pince remarks, in a subsequent letter, which accompanied some specimens of bark of all these varieties:—"I wish particularly to call your attention to the specimens of bark of the varieties of the new evergreen Lucombe oaks, which I send you herewith. You will observe that they are very corky. The produce of hybrids often assimilates to one parent more than to another: and thus, in the varieties of the new Lucombe oak alluded to, there is a great assimilation to the male parent, *Q. Sùber*, in the thickness and texture of the bark, the density of the wood, and the dark green, almost black, evergreen foliage; whilst, in the conical shape of the tree, and its rapid growth, the habits of the female parent are retained. — *Id. April* 20."

♀ Q. C. 10 *L. críspa*, *Q.* Lucombeàna críspa *Hort.*, the new Lucombe Oak, (*fig.* 1715.) has the leaves somewhat curled at the edges, and the bark



1715



1716

corky. *Fig.* 1717. *c* shows the form of the leaf, in its natural size; and *fig.* 1718. is a portrait, by Mr. Gendall of Exeter, of the specimen tree in the Exeter Nursery; which, 45 years planted, is 63 ft. high; and the diameter of the trunk, at 1 ft. from the ground, is 3 ft. The bark, from the specimens sent to us, bears a close external resemblance to that of the cork tree, and is above 1 in. thick.

♀ Q. C. 11 *L. suberòsa*, *Q.* L. suberòsa *Hort.*, (*fig.* 1717. *a*) has the leaves somewhat longer, and the bark double the thickness of the preceding variety; the specimen sent us measuring 2 in. in thickness. The

1717



a *b* *c*

specimen tree in the Exeter Nursery is 45 ft. high; and the trunk, at the base, measures 7 ft. 6 in. in circumference.

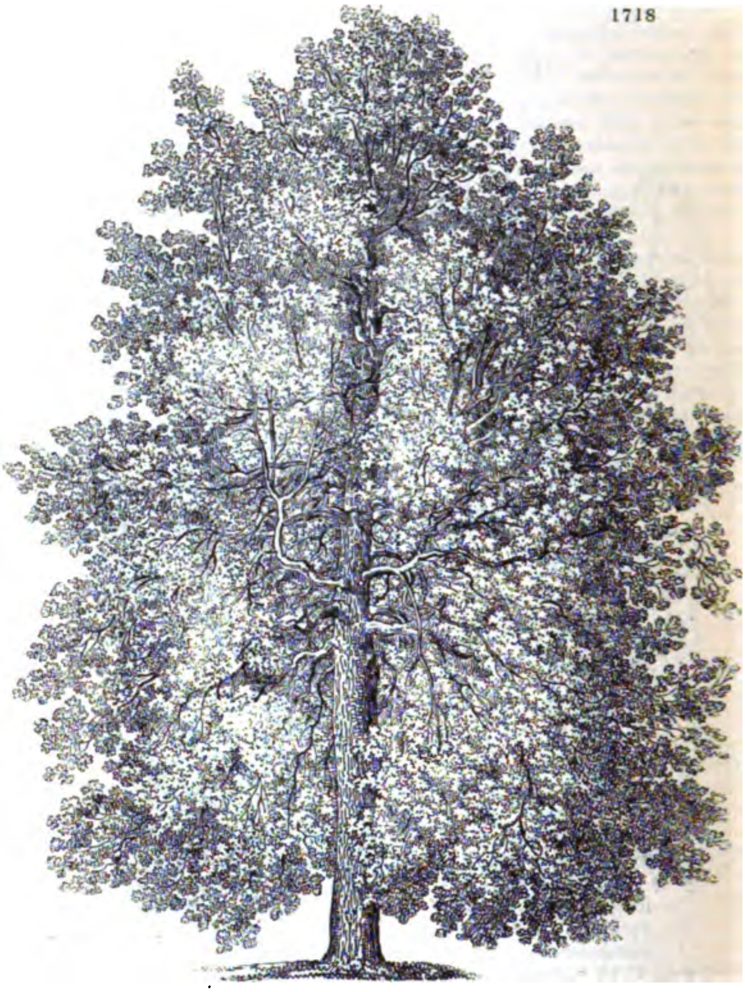
♀ Q. C. 12 *L. incisa*, Q. L. incisa *Hort.*, (*fig.* 1717. *b*) has the leaves longer, and somewhat more deeply cut, than those of the preceding varieties. The tree in the Exeter Nursery is 45 ft. high; and the circumference of the trunk, at the base, is 7 ft.

♀ Q. C. 13 *L. dentàta*, Q. L. dentàta *Hort.*, (*fig.* 1716.) is a fine large-leaved evergreen variety, lately raised in the Exeter Nursery, and of which there will be plants for sale in the autumn of 1837.

♀ Q. C. 14 *heterophýlla*, Q. L. heterophýlla *Hort.*, (*fig.* 1719.) has very variable foliage, and is also a recent production of the Exeter Nursery. Of these two new seedlings, Messrs. Lucombe and Pince inform us that they have a great opinion.

Other Varieties. Q. C. *bullàta*, the blistered, or rough-leaved, Turkey oak, is mentioned by Miller; and he probably meant it to apply to *Q. C.* càna, which has rougher leaves than any other variety that we are acquainted with. In the Fulham Nursery there is a variety of the Fulham oak propagated, Q. C. *dentàta péndula*, which is said to have pendulous shoots; but we have never seen a plant large enough to enable us to determine whether it is sufficiently distinct to be recorded as such. To the varieties mentioned above some dozens might be added, by selecting specimens with widely different-shaped leaves, and continuing them by grafting. In short,

1718



Quércus Cérris Lucombeàna críspa, in the Exeter Nursery.
Height 63 ft. ; girt of the trunk 9 ft. ; diameter of the head 48 ft.

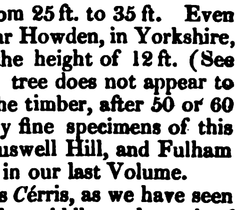
with the exception of the Lucombe and the Fulham oaks, and the pendulous-branched Turkey oak, we think that the varieties of *Q. Cérris* are scarcely worth keeping apart, since equally interesting ones may at any time be obtained by raising a number of plants from the acorn. In proof of this we may refer to any plantation containing a number of Turkey oaks which have been raised from seed; and one that just occurs to us is a small avenue of these trees in the Zoological Gardens in the Regent's Park.

Description, &c. The Turkey oak is a free-growing tree, with straight vigorous branches, which take a much more upright direction than those of the British or common oak; and both branches and twigs are, in every stage of the tree's growth, wholly free from the tortuous character of those of that species. The trunk is also straighter; but the branches, at their junction

1719



with it, being remarkable for an unusual degree of expansion, as shown in *fig.* 1720., the trunks of middle-aged trees, as it is observed in the *Dictionnaire des Eaux et Forêts*, often appear gibbous. The bark is comparatively smooth and dark when young, but corky as it grows old; and it is reckoned less liable to chap and crack than that of the common oak. The leaves are of a beautiful bright shining green, somewhat glaucous or hoary beneath; and they vary so exceedingly in size and shape in different trees raised from seed, that almost every individual, if described from the leaves alone, might be constituted a distinct species: they have short footstalks, and are most readily distinguished from those of oaks of every other section by their small buds, and the numerous linear persistent stipules which proceed from them. The acorns are sessile, or on very short footstalks; and they are easily known by the bristly or mossy clothing of their cups. They are remarkably bitter and austere; a circumstance noticed by Pliny, who says, "Glans cerro tristis, horrida, echinato calice, seu castaneæ." (See *Secondat*, &c., p. 15.) In the climate of London, young plants make shoots, in one season, of from 1 ft. 6 in. to 3 ft. or 4 ft. in length; and, in ten years from the acorn, in good soil, they will attain the height of from 25 ft. to 35 ft. Even in the comparatively cold climate of Knedlington, near Howden, in Yorkshire, plants, seven years from the acorn, have attained the height of 12 ft. (See *Gard. Mag.*, vol. xi. p. 251.) The duration of the tree does not appear to be nearly so great as that of the British oak; and the timber, after 50 or 60 years' growth, is apt to get shaky. There are very fine specimens of this tree in the neighbourhood of London, at Syon, Muswell Hill, and Fulham Palace; of the first two of which there are portraits in our last Volume.



1720

Geography, History, &c. The range of the Quércus Cérris, as we have seen under the head of *Specific Character*, is limited to the middle and south of Europe, and the west of Asia. The tree, though known to Pliny, has been very little noticed by modern botanists, even on those parts of the Continent where it is indigenous; and in England, Sir J. E. Smith, only a few years ago, had never seen the acorns. In the catalogues, it is indicated as having been brought into cultivation by Miller, in or before 1735, as it is first mentioned in the Appendix to the third edition of his *Dictionary*, published in that year. It had existed in the country, however, long before that period; because, in the same edition of the *Dictionary*, the Ragnal Oak, already noticed among the varieties (p. 1849.), is described as a large tree.

Properties and Uses. The wood and bark of the Turkey oak are by some considered as having the same properties as those of the British oak; but, as it

is only about a century since the tree was introduced into this country, very few specimens have attained a sufficient size to be cut down for timber, and very little experience has been obtained on the subject. One of considerable dimensions, felled, a few years ago, in a part of the Mile End Nursery which was given up for building on, and employed as posts and boarding in a stable, is said to have decayed with extraordinary rapidity. Mr. Atkinson, who has made several experiments with the wood of the common oak (see p. 1787.), wished to try some with that of *Q. Cérris*, but was only able to obtain one specimen of sufficient age grown in England. This was about 1826, when two trees were cut down at East Hampstead, in Berkshire, a seat belonging to the Marquess of Downshire; and the wood was made into doors for the principal rooms of the mansion. The wood of this tree, Mr. Atkinson says, "is much finer in the grain than that of our British oak, or foreign wainscot: it takes a better polish, and is more beautiful, than any other oak that I have ever seen. From only a single specimen, which I had broken, it was not so strong as our native oak, but equal in toughness; but my specimen being rather cross-grained, it was not a correct experiment, and I suspect it is equal in strength to our oak. For all ornamental purposes, where the wood has to be polished, it is superior; and must be a profitable tree to plant, as it grows much quicker than our common oaks; and I have seen it thrive rapidly in poor land." (*Hort. Trans.*, 2d series, vol. i. p. 338.) On application to the Marquess of Downshire, in March, 1837, to ascertain the present opinion entertained at East Hampstead respecting the wood of the Turkey oak, we have been informed that the wood is not much inferior to that of the English oak if kept quite in the dry; but that it will not stand in water, or in situations where it is alternately wet and dry, so well as that species: that if the tree is allowed to grow to the ordinary age at which the British oak is felled, the wood is very apt to get shaky at the heart: and that Turkey oaks require to be felled as soon as any dead twigs are seen in the topmost boughs; or in about 60 or 80 years after planting. Mr. Richardson, who has witnessed the rapid growth of the *Q. Cérris* at Lady Tankerville's villa at Walton on Thames, where he has been gardener for upwards of 40 years, says that, in deep sandy soil, it grows much faster, and makes a taller straighter tree, with more timber in the trunk in comparison to what is contained in the branches, than either the common oak, or any other species of the genus. (See *Gard. Mag.*, vol. x. p. 336.) In the *Dictionnaire des Eaux et Forêts*, the wood is said to be very solid, and very good both for civil and naval purposes; more especially that which is grown in the south of France; which, from the warmth of the climate, is found to be harder and more durable than that grown in the north. Bosc, and also the writers of the article on Quércus in the *Nouveau Du Hamel*, say that the wood is preferred for ship-building in the south of France; and also that the tree attains a larger size on poor sandy soil than the common oak. In Olivier's *Travels*, it is stated that the wood of *Q. Cérris* is brought to Constantinople from the southern shores of the Black Sea, and employed both in ship-building and in the framework of houses. Whatever may be the properties of the wood of the Turkey oak in the south of Europe or the Levant, the experience of it in Britain, hitherto, can hardly justify our recommending it for other purposes than those of cabinet-making and joinery. The tree, however, is one of very great beauty, both in point of form and foliage; and, being of great rapidity of growth, it is equalled by few for ornamental plantations. The foliage of some varieties is persistent, like that of the beech and the hornbeam: and of others, supposed, as we have seen (p. 1855.), to be hybrids, it is subevergreen, or so near being completely evergreen, as to be retained on the trees till May.

Propagation and Culture. The species, and most of the varieties, ripen acorns in England, from which plants are raised with great facility; but the varieties, like those of every other oak, being very liable to sport, can only be continued by grafting or by layers. The stocks employed may be either those of *Q. Cérris*, or of the common British oak; and the grafting may be

performed in the whip manner, with as great certainty of success as in grafting common fruit trees. Some nurserymen find the new evergreen varieties of the new Lucombe oak to take by grafting more readily than the old Lucombe oak; and others prefer stocks of *Q.* pedunculàta to those of *Q.* Cérris. In the nursery, the plants ought to be annually removed; because scarcely any species of oak suffers so much from transplanting as the different varieties of *Q.* Cérris. Purchasers of these varieties, therefore, would do well to bespeak them from the grower a year before they require them to be taken up; or to purchase them in spring, on condition of their being immediately taken up, pruned, and replanted, preparatory to their being taken up and removed to their final destination in the succeeding autumn. It is much better for a purchaser to pay double the usual price for plants properly treated in the nursery, than to have one half, or, as we have known sometimes, two thirds, of them entirely fail from nursery mismanagement.

Statistics. In the environs of London, at York House, Twickenham, 50 years planted, it is 50 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 20 ft.; at the Priory, at Stanmore, it is 58 ft. high, the diameter of the trunk 1 ft. 10 in., and of the head 32 ft.; at Syon, it is 70 ft. high, the diameter of the trunk 2 ft. 8 in., and that of the head 73 ft.; at Muswell Hill, 72 years old, it is 62 ft. high, the diameter of the head 50 ft. — South of London. In Cornwall, at Carclew, it is 74 ft. high, the diameter of the trunk 3 ft. 9 in., and of the head 64 ft. In Devonshire, at Mamhead, there are three trees, the largest of which is 100 ft. high, and the others 90 ft. and 80 ft. respectively; the circumference of the trunk of the first is 12 ft., of the second 15 ft., and of the third 14 ft. 1 in.; the probable age of these trees is between 70 and 80 years, having been planted by Mr. Lucombe: at Killerton, 34 years planted, it is 67 ft. high, the diameter of the trunk 2 ft., and of the head 43 ft.: at Bystock Park, 18 years planted, it is 50 ft. high; and at Endsleigh Cottage, 15 years planted, it is 40 ft. high. In Dorsetshire, at Melbury Park, 44 years planted, it is 70 ft. high, the diameter of the trunk 3 ft. 9 in., and of the head 40 ft. In the Isle of Wight, in Wilkins's Nursery, 30 years planted, it is 40 ft. high. In Kent, at Cobham Hall, 13 years planted, it is 36 ft. high. In Somersetshire, at Nettlecombe, 68 years planted, it is 74 ft. high, the diameter of the trunk 4 ft., and that of the head 71 ft. In Surrey, at Deepdene, 10 years planted, it is 24 ft. high.; at Nutfield Blechingley, 21 years planted, it is 34 ft. high, the diameter of the trunk is 2 ft. 10 in., and of the head 27 ft. In Wiltshire, at Longleat, 50 years planted, the species is 60 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 46 ft.; at Longford Castle, it is 60 ft. high, diameter of the trunk 3 ft. 6 in., and of the head 66 ft.—North of London. In Bedfordshire, at Woburn Abbey, specimens 24 years old are from 30 ft. to 40 ft. high; at Ampthill, 85 years planted, it is 80 ft. high, diameter of the trunk 3 ft., and of the head 50 ft. In Denbighshire, at Kinmel Park, 20 years planted, it is 32 ft. high, diameter of the trunk 1 ft., and of the head 18 ft.; at Eaton Hall, 14 years planted, it is 30 ft. high. In Lancashire, at Latham House, 27 years planted, it is 37 ft high, the diameter of the trunk 16 in., and of the head 32 ft. In Leicestershire, at Whitton House, 30 years planted, it is 46 ft. high, the diameter of the trunk 1 ft. 10 in. In Nottinghamshire, at Clumber Park, it is 53 ft. high, the diameter of the trunk 2 ft. 10 in., and of the head 52 ft. In Northamptonshire, at Wakefield Lodge, 10 years planted, it is 26 ft. high. In Shropshire, at Hardwicke Grange, 10 years planted, it is 32 ft. high, the diameter of the trunk 8 in. In Warwickshire, at Allesley, 26 years planted, it is 48 ft. high, the diameter of the trunk 17 in.; at Springfield, 30 years planted, it is 34 ft. high, the diameter of the trunk 11 in. In Worcestershire, at Croome, it is 80 ft. high, diameter of the trunk 2 ft. 9 in., and of the head 80 ft. In Yorkshire, at Ripley Castle, 16 years planted, it is 34 ft. high, the diameter of the trunk 10 in., and of the head 12 ft.; at Knedlington, 7 years from the acorn, it is 12 ft. high.—In Scotland. In the environs of Edinburgh, at Hopetoun House, it is 50 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 52 ft. — South of Edinburgh. In Renfrewshire, at Erskine House, 25 years planted, it is 36 ft. high, the diameter of the trunk 11 in. — North of Edinburgh. In Cromarty, at Coul, 20 years planted, it is 38 ft. high, the diameter of the trunk 13 in., and of the head 30 ft. In Ross-shire, at Brahan Castle, it is 50 ft. high, the diameter of the trunk 2 ft., and that of the head 35 ft.—In Ireland. In the environs of Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 35 ft. high, the diameter of the trunk 1 ft. 4 in., and of the head 25 ft.; at Cypress Grove, it is 70 ft. high, the diameter of the trunk 2 ft., and of the head 50 ft. In King's county, at Charleville Forest, 10 years planted, it is 24 ft. high, the diameter of the trunk 2 ft., and of the head 14 ft. In Fermanagh, at Florence Court, 38 years planted, it is 70 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 56 ft.

In Foreign Countries. In France, in Brittany, at Barres, 12 years planted, it is 30 ft. high. In Hanover, at Göttingen, in the Botanic Garden, 25 years old, it is 30 ft. high, the diameter of the trunk 8 in., and of the head 20 ft. In Bavaria, in the Botanic Garden, Munich, 20 years old, it is 15 ft. high, the diameter of the trunk 6 in. In Austria, at Vienna, in the University Botanic Garden, 20 years old, it is 25 ft. high, diameter of the trunk 9 in., and of the head 12 ft.; at Brück on the Leytha, 50 years old, it is 36 ft. high. In Prussia, at Berlin, at Sans Souci, 50 years old, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 18 ft. In Italy, in Lombardy, at Monza, 24 years planted, it is 35 ft. high, the diameter of the trunk 1 ft. 8 in., and of the head 22 ft.

Commercial Statistics. Acorns, in London, 10*s.* per bushel; one year's seedling plants, 10*s.* per thousand; two years' seedlings, 50*s.* per thousand; two years' seedlings, one year transplanted, 20*s.* per thousand. The Lucombe and Fulham oaks, from 2*s.* 6*d.* to 3*s.* 6*d.* each. *Q.* Cérris, at Bollwyller, is 2 francs a plant; at New York, 50 cents, and the Lucombe oak 1 dollar.

⚘ 7. *Q.* Æ'GILOPS *L.* The Ægilops, *or Valonia*, Oak.

Identification. Lin. Sp. Pl., 1414.; Willd., No. 61.; Ait., No. 20.; Mill. Ic., t. 215.; Oliv. Trav. Eng. ed., vol. 2. p. 44.; N. Du Ham., 7. p. 175.; Smith in Rees's Cycl., No. 58.
Synonymes. *Q.* orientàlis, &c., *Tourn. Cor.*, 40.; Æ'gilops sive Cérrus mas *C. Bauhin*, *Secondat*;

Velàni Tourn. Voy., 1. p. 128.; Glàns *Cérri Dalech. Hist.*, 1. p. 7., the great prickly-cupped Oak; Chêne Velani, *Fr.*; Chêne Velanède *Bosc*; Knopper Eiche, *Ger.*

Engravings. Mill. Ic., 2. t. 215.; Oliv. Travel., t. 13.; N. Du Ham., 7. t. 51.; our *fig.* 1721.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves ovate-oblong, with bristle-pointed tooth-like lobes; hoary beneath. Calyx of the fruit very large, hemispherical, with lanceolate, elongated, spreading scales. (*Smith.*) A tree, a native of the islands of the Archipelago, and throughout all Greece; attaining, according to Tournefort, the dimensions of the common oak, in favourable situations in the Levant; but not growing even so high as the Turkey oak, according to Olivier. It was introduced in 1731, but has never been extensively cultivated. Leaves stalked, about 3 in. long, bright green; a little downy at the back; their edges very coarsely and acutely serrated, rather than lobed; each tooth tipped with a bristly point. Acorn large, short, and a little hollow at the top. Cup sessile, woody, 2 in. or 3 in. in diameter, from the projection of its numerous, long, oblong, reflexed, petal-like scales. The tree, according to Olivier, is not so lofty as the Turkey oak; nor is the wood much esteemed, except in cabinet-work. Miller observes that this is "one of the fairest species of oak in the world;" that it thrives very well in the open air in England, and is never injured by frost. The fruit, according to *Martyn's Miller*, is called velani; and the tree, velanida, by the modern Greeks; but, according to Olivier, the name velani is applied to the tree, and velanida to the fruit. The cups and acorns are annually brought to Europe, where they are in great demand for tanning, being said to contain more tannin in a given bulk of substance than any other vegetable. According to M'Culloch, these acorns, which are commonly called valonia, form a very considerable article of export of the Morea and the Levant; averaging, in 1831 and 1832, nearly 150,000 cwt. a year, and being sold at from 12*l.* to 15*l.* per ton. "The more substance there is in the husk, or cup, of the acorn, the better. It is of a bright drab colour, which it preserves so long as it is kept dry; and dampness injures it, as it then turns black, and loses both its strength and value. It is principally used by tanners, and is always in demand. Though a very bulky article, it is uniformly bought and sold by weight. A ship can only take a small proportion of her register tonnage of valonia; so that its freight per ton is always high." (*M'Cull. Dict.*, p. 1203.) We agree with Miller in considering Q. Æ'gilops as one of the most splendid species of the genus, and we would strongly recommend it to every lover of fine trees. A kind of gall is found on this tree, somewhat similar to that found on Q. infectòria, and which is employed in the same manner. These galls are rugose, and of an angular form; and are either the fruit itself, distorted by the puncture of the insect, or merely the scaly cup, which is enlarged into a gall. The insect which pierces it is, according to M. Van Burgdorf, Cýnips quércus cálycis. It is found in Greece, and in the islands of the Mediterranean Sea. (*Burmeister Handb. der Ent.*, sect. 310.) In British nurseries, Q. Æ'gilops is not very common, though there can be no difficulty in procuring acorns from the Continent. There is a tree at Syon, 22 ft. high, which bears fruit annually, and even the small tree at Messrs. Loddiges's, of which a portrait is given in our last Volume, bears fruit.



1721

Varieties.

- ♀ Q. Æ. 2 *péndula* has drooping branches. There is a small tree of this variety in the Fulham Nursery.
- ♀ Q. Æ. 3 *latifòlia* Hort. has leaves rather broader than the species. There is a tree of this variety in the Horticultural Society's Garden.

Statistics. In the environs of London, at Syon, it is 22 ft. high, diameter of the trunk 1 ft., and of the head 24 ft.: in Denbighshire, at Llanbede Hall, 20 years planted, it is 35 ft. high, the girt of the trunk 2 ft. 8 in., and the diameter of the head 14 ft.: in Suffolk, at Finborough Hall, 30 years planted, it is 40 ft. high, the diameter of the trunk 1 ft. 8 in., and of the head 30 ft. In Ireland, in Louth, at Oriel Temple, 60 years planted, it is 55 ft. high. In France, at Toulon, in the Botanic Garden, 10 years old, it is 19 ft. high. In Bavaria, at Munich, in the English Garden, 30 years old, it is 10 ft. high, the diameter of the trunk 3 in., and of the head 4 ft. In Italy, at Monza, 24 years old, it is 23 ft. high, the diameter of the trunk 6 in., and of the head 18 ft.

Commercial Statistics. Plants, in the London nurseries, are 7*s.* 6*d.* each; of the pendulous-branched variety, 3*s.* 6*d.* each: at Bollwyller, plants are 3 francs each.

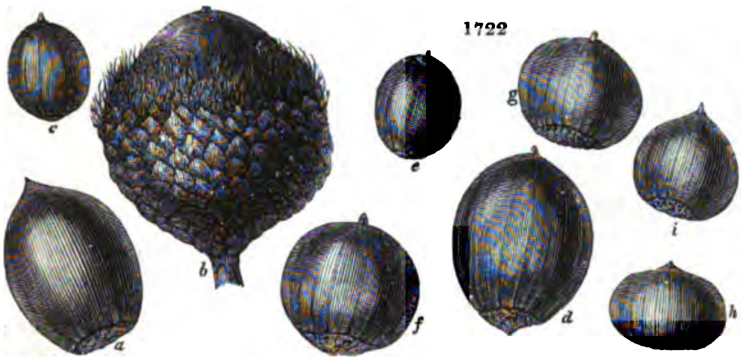
Q. *Túrneri*, Q. *austràlis*, and some other sorts, may possibly belong to the section *Cérris*; but, as there are great doubts on the subject, we have thought it better to include them in an Appendix.

§ iii. *A'lbæ.* *White American Oaks.*

Sect. Char. Leaves lobed, and sinuated, not mucronated; broadest at the upper extremity; dying off more or less shaded with a violet colour. Bark white, or whitish brown, cracking and scaling off in thin laminæ. Fructification annual. Cups imbricate or echinate. Nut oblong, generally large.

The American oaks being generally propagated in Europe by acorns imported from America, we shall here give a comparative view of the acorns of some of the common kinds. *Fig.* 1722. represents acorns of the natural size,

1722



of all the kinds that were imported by Mr. Charlwood, seedsman, of London, in the year 1836; but that year being unfavourable for the ripening of acorns in America, fewer sorts were imported than usual, and the nuts of these few are under the average size. In this figure, *a* is the acorn of Quércus álba; *b*, that of Q. macrocárpa, with the cup on; *c*, that of Q. obtusíloba; *d*, Q. *Prìnus* tomentòsa; *e*, Q. *P.* pùmila; *f*, Q. tinctòria; *g*, Q. nìgra; *h*, Q. *Phéllos*; and *i*, Q. palústris.

We may here observe that most sorts of the American oak in Messrs. Loddiges's collection (the most complete in Europe) can be propagated by grafting on the common oak, close to the ground; and largely earthing up the grafts afterwards, so as to leave only the points of the scions exposed to the air. This earthing up not only preserves a uniform degree of moisture round the graft; but the earth employed being taken from the adjoining surface, and consequently having been heated by the sun, produces an immediate increase of temperature round the graft, which gives an impulse to the rising sap, and so accelerates vegetation.

It may be proper to notice that the specimens of American oaks in the Horticultural Society's Garden are in general stunted, and by no means exhibit the average growth of such trees in the climate of London. The reason

is, they have for the most part been planted in clumps along with elms; which, being vigorous, rapid-growing trees, have robbed the soil of moisture, and overshadowed and stunted the oaks. In any of the London nurseries where the American oaks have been allowed to stand 6 or 8 years in the same place, they will be found of twice the height of those in the Chiswick Garden; and, instead of being crooked, stunted, and unhealthy, they are straight and vigorous. We may refer to a few which are generally to be found in the Hammersmith and Fulham nurseries; but we wish, in a particular manner, to direct attention to the specimen trees of American oaks in Loddiges's arboretum, and to some hundreds of plants which they have for sale in their adjoining nursery ground. Among the latter, we observed on May 5th, 1837, above 100 plants of Quércus palústris, the hardiest, the most rapid-growing, and, in our opinion, the most beautiful, of all the American oaks; which, at 7 years from the acorn, were from 15 ft. to 20 ft. in height. In the Leyton Nursery, near Stratford-le-Bow, there were, till the sale of the stock of that nursery in the autumn of 1836, a great variety of American oaks, selected by the late Mr. Hill from seed-beds, and planted across the nursery in rows in different directions, for shelter. The variety and beauty of these oaks exceeded anything of the kind we ever before saw: in spring, when they were coming into leaf; in summer, when they were in full foliage; and in autumn, when they were dying off of every shade of brilliant scarlet, yellow, red, and purple. The plants were mostly from 10 to 12 years from the acorn; were transplanted into these rows, after making 2 years' growth in the seed-beds; and, with the exception of Q. Banísteri, and two or three other low-growing kinds, they were all from 20 ft. to 30 ft. in height. The portrait of Q. palústris in our last Volume, taken from a tree in the Leyton Nursery, will give an idea of the progress made by that species there. In the London Horticultural Society's Garden, though about the same age, it is not half that height. (See Q. palústris.)

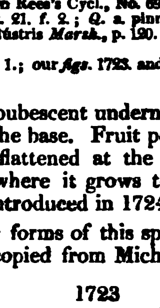
☨ 8. Q. A'LBA *Lin.* The *American* white Oak.

Identification. Lin. Sp. Pl., 1414; Banist. Cat. Stirp. Virg.; Willd. Sp. Pl., 4. p. 449.; Pursh, vol. 2. p. 633.; Michx. Quer., No. 4. t. 5.; N. Du Ham., 7. p. 175.; Smith in Rees's Cycl., No. 69.
Synonymes. Q. álba virginiàna *Park. Theat. Bot.*, *Cat. Carol.*, 1. t. 21. f. 2.; Q. a. pinnatífida *Walt. Carol.*, p. 230., No. 10., *Michx. Fl. Bor. Amer.*, 2. p. 195.; Q. palústris *Marsh.*, p. 120. No. 3.; Chène blanc de l'Amérique, *Fr.*; weisse Eiche, *Ger.*
Engravings. Cat. Carol., 1. t. 21. f. 2.; Michx. N. Amer. Syl., vol. 1. t. 1.; our *figs.* 1723. and 1726.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves oblong, pinnatifidly serrated; pubescent underneath; lobes linear-lanceolate, obtuse, entire, attenuated at the base. Fruit pedunculated. Calyx somewhat cup-shaped, warty, and flattened at the base. Acorn oval. (*Willd.*) A native of North America, where it grows to the height of 60 ft., or upwards, and flowers in April. Introduced in 1724.

Varieties. The elder Michaux gives the two following forms of this species, the leaves of both of which are shown in *fig.* 1723. copied from Michaux's *Histoire des Chênes Ameriques*: —

1723



☨ Q. *a.* 1 *pinnatífida* Michx. Fl. Bor. Amer., ii. p. 195., *Hist. des Chênes Amér.*, t. 5. f. 1., and our *fig.* 1723. *a*; Q. álba *Ban. Cat. Stirp. Virg.*; Q. virginiàna *Catesb. Carol.*, i. p. 21. t. 21.; and Q. a. palústris *Marsh.*, p. 120. No. 3.—This is the usual form of the species, and is common in North America, from Canada to Florida. *Fig.* 1726. is a sprig and acorn of Q. álba pinnatifida, taken from Michaux's *North American Sylva*, vol. i. t. 1.; and the acorn without its calyx is shown in *fig.* 1722. at *a*.

☨ Q. *a.* 2 *repánda* Michx. l. c., Hist. des Chênes, t. 5. f. 2., Du Roi, t. 5. f. 5., and our *fig.* 1723. *b*, which is found wild in the forests of Carolina, and which sometimes occurs in seed-beds of Q. álba in Europe. *Fig.*



1724

1724. is from a sprig apparently of this variety, grown in the Horticultural Society's Garden, under the name of *Q.* álba. In Messrs. Loddiges's arboretum is an oak named *Q.* squamòsa, from a specimen of which *fig.* 1725. was taken. This tree, which is 20 ft.



1725

high, has exactly the appearance, bark, and habit of growth of *Q.* álba, and as it only differs from it in the shape of the leaves, it may probably be a variation of this variety.

Description. The American white oak, according to Michaux, bears most resemblance to *Q.* pedunculàta, which is sometimes called the white oak in Europe. *Q.* álba, in the American forests, is often 70 ft. or 80 ft. high, and with a trunk 6 ft. or 7 ft. in diameter; but its proportions vary with the soil and climate. Cobbett says that it is " amongst the least curious and beautiful of the American oaks." The leaf, he adds, " is small, and the shape and colour not very handsome." According to Michaux, the leaves are regularly and obliquely divided into oblong rounded lobes, destitute of points or bristles; and the indentations are the deepest in the most humid soils. " Soon after their unfolding, the leaves are reddish above, and white and downy beneath; when fully grown, they are smooth, and of a light green on the upper surface, and glaucous underneath. In the autumn they change to a bright violet colour." (*N. Amer. Syl.*, i. p. 19.) Michaux adds that this is the only American oak that retains some of its withered leaves till spring The acorns are large, oval, and very sweet; and they are contained in rough, shallow, greyish cups. They are borne singly, or in pairs, on long peduncles, " attached, as in all the species with annual fructification, to the shoots of the season." The fruit is rarely

abundant; and sometimes not above a handful of acorns can be found in a large forest. The acorns have a very thin and brittle shell: they ripen early, and, according to Cobbett, germinate so easily, that, "if warm rains come on in the month of November, which they very frequently do in America, the acorns still clinging to the trees actually begin to sprout before they are shaken down by the winds." (*Woodlands*, § 542.) Some trees produce acorns of a deep blue colour; but Michaux had seen only two specimens of this variety; one in the grounds of Mr. Hamilton, near Philadelphia, and the other in Virginia. The bark of this tree is white (whence the species derives its name); and, though it is often variegated with large black spots, it has such a silvery hue, that the tree may be easily distinguished by it even in winter. The bark is scaly; and, on young trees, it appears divided into squares, but, on old trees, into plates laterally attached. The wood is reddish, somewhat resembling that of the British oak, but lighter, and less compact. The rate of growth of this tree, in British gardens, where the soil is good and the situation sheltered, may be considered as nearly equal to that of the common oak; but without shelter, even in a good soil, the tree has a stunted appearance for many years, as is evident from a tree of 20 years' growth in the Hackney arboretum, and several in the Horticultural Society's Garden, of two of which *fig.* 1727. presents portraits. The largest



1726

1727



trees that we know of are between 60 ft. and 70 ft. high; and, both at York House near Twickenham, and at Muswell Hill, they have ripened acorns.

Geography. *Q.* álba is found as far north as Canada, N. L. 46° 30′; and thence it was traced by the two Michaux, as far as Cape Canaveral, N. L. 28°; and westward, from the ocean to the country of Illinois; a distance of above 1200 miles from north to south, and nearly as much from east to west. It is not, however, equally distributed over this extensive tract of country, being found either in very dry and sandy, or in very rich, soils. The white oak is in the greatest abundance in those parts of Pennsylvania and Virginia that lie

between the Alleghany Mountains and the Ohio, in a yellow soil, composed of clay with a mixture of calcareous stones, which produces excellent wheat.

History. The white oak, according to the elder Michaux (*Hist. des Chênes*), was the first American oak known in Europe; and it is not only mentioned, but a figure of a single leaf of it is given, in Parkinson's *Herbal*, printed in 1640. Parkinson having just described *Q. E'sculus*, adds, "They have in Virginia, a goodly tall oke, which they calle the white oke, because the barke is whiter then others; whose leafe, because it so neerely resembleth this sweet oke, I have joyned with it. The ackorne, likewise, is not only sweeter then others, but, by boyling it long, it giveth out an oyle, with which they keep supple their joynts." (p. 1387.) The leaf figured bears a very close resemblance to those of the *Q.* álba given by the two Michaux. Catesby, writing, probably, about 1728, says that the *Q.* álba virginiàna of Parkinson closely resembles the common British oak. He adds that the bark is white, and that the grain of the wood is very fine; also, that there is a variety of it called the scaly white oak, which is found in Virginia. (*Catesb. Carol.*, i. p. 21.) Kalm, in his *Travels*, about the year 1740, says that the white oak is the kind of tree which is found in greatest abundance in good ground near Philadelphia. It is stated in the *Hortus Kewensis* to have been introduced in 1724; and it is not only included in the list published by the Society of Gardeners, in 1730 (see p. 77.), but is one of the oaks enumerated by Catesby, as being "then growing at Mr. Fairchild's." (*Catesb. Carol.*, p. 22.) The tree has never been much planted in Britain, from the difficulty of bringing over the acorns. About the year 1820, when Cobbett returned from America, and commenced nurseryman, he strongly recommended the tree, and raised and sold several thousand plants of it, though he acknowledged that he had great difficulty in bringing the acorns in a sound state to England.

Properties and Uses. Pursh calls the white oak one of the most abundant and useful of its genus in America. The elder Michaux states that it is preferred to all other oaks, both for house and ship building, in that country; and Michaux the younger informs us that, in Philadelphia, Baltimore, and nearly all the towns in the middle states, the framework of all the well-built houses, whether of wood or brick, is of the timber of this tree. It is seldom, however, he adds, used for the floors or outer covering of wooden houses, from its liability to warp and split. The wood of young trees is very elastic, and capable of such minute division, that it is used for many of the purposes of the willow or the bamboo, or even whalebone; such as basket-making, carpet-brooms, seats and backs for chairs, the rims of sieves, the bottoms of riddles, and carter's whips, which are made in the following manner :—"A tapering piece of the wood is cleft in nine, from the small end to within 1 ft. of the other end, which is left solid for the hand. These nine spleets are then twisted by threes, and the threes again twisted together; the whole is then sewed in a case of black leather, and a silken thong added, which completes the whip." (*Birkbeck's Notes*, &c., p. 71.) The wood is also used, in America, for milk-pails, the handles of axes, and numerous other rural purposes. "Of all the species," says the younger Michaux, "that grow east of the Mississippi, the white oak alone furnishes staves for casks, proper for containing wines and spirituous liquors. The domestic consumption for this purpose is immense; and vast quantities are exported to the West Indies, Great Britain, and the Islands of Madeira and Teneriffe." (*N. Amer. Syl.*, i. p. 22.) The bark is employed for tanning the leather for saddles, and other articles which require to be of a fine texture; but the bark of the white oak is so much thinner than that of the red, that it is rarely used for the purposes of ordinary tanning. The acorns are sweet, and are eaten by the Indians.

Propagation and Culture. (See p. 1727.) We may here repeat, as applicable to all the oaks of this and the succeeding sections, that the acorns may be brought over with perfect safety, if bedded in moist live moss (Sphágnum). They will require no attention during the voyage; but, as they will have germinated by the time of their arrival in Britain, they should be immediately planted, with or without pinching off the extremities of such of the radicles as

may have pushed above 1 in. in length. Cobbett recommends gathering the acorns before they are quite ripe, drying in the sun, and packing in dry sand; but by this mode, we think, the vital principle would not be so well preserved as by packing them in *Sphágnum*.

Insects. In America, the white oak is infested with numerous insects, some of which are figured in *Abbott and Smith's Insects of Georgia.* Phalæ`na (? Pygæ`ra) álbifrons (t.80., and our *fig.* 1728.), the white-tip moth, is by no means a common kind. The caterpillar, which is of a pinkish colour, striped with yellow, white, and black, has a fine polish, as if glazed or varnished. The whole brood feeds together, especially when small. One observed by Abbott spun itself a thin white web, between the leaves of the oak, on October 28th, and came out on the 18th of February. The chrysalis is of a reddish brown, and the perfect insect of a dull brown, tinged with yellow. *Phalæ`na* (Notodónta) Auròra (*Abb. and Smith*, t. 87., and our *fig.* 1729.), the pink and yellow prominent moth, was taken by Abbott on the white oak. "The caterpillar went into the ground, and enclosed itself in a thin case of dirt, on July 15th, appearing on the wing on August 7th. Sometimes this species buries itself in the autumn, and remains

1728





1729

till spring, at which season the moth may now and then be observed sitting on the oak branches."

Statistics. In the environs of London, at Fulham Palace, a tree bearing this name, between 100 and 120 years old, is 60 ft. high, but it appears to us to be nothing more than *Q.* pedunculàta; at York House, Twickenham, it is 50 ft. high; at Muswell Hill, 72 years old, it is 61 ft. high, the diameter of the trunk 6 ft. 6 in., and of the head 70 ft. In France, in Brittany, at Barres, 8 years planted, it is 9 ft. high. In Austria, at Vienna, in the park at Laxenburg, 10 years planted, it is 20 ft. high. In Bavaria, at Munich, in the English Garden, 10 years old, it is 7 ft. high. In Italy, in Lombardy, at Monza, 24 years planted, it is 30 ft. high, the diameter of the trunk 8 in., and of the head 10 ft.

Commercial Statistics. The name of the white oak does not occur in any of the London nursery catalogues of the present day, with the exception of that of Messrs. Loddiges; neither is it in the Bollwyller catalogue. In that

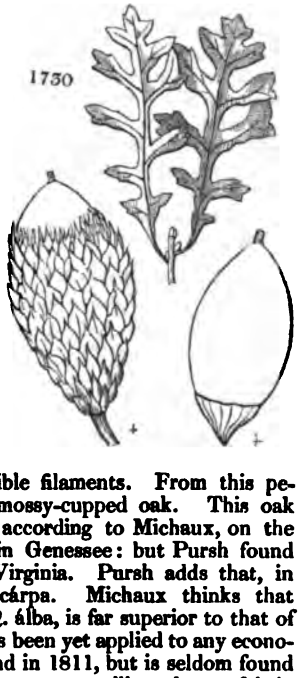
of Prince, of New York, for 1829, Fox's white oak (a variety of which we know nothing) is mentioned as being 37½ cents a plant.

♀ 9. Q. OLIVÆFO'RMIS *Michx.* The Olive-shape-*fruited American* Oak.

Identification. Michx. Arb., 2. p. 32.; N. Amer. Syl., 1. p. 32.; Pursh Fl. Amer. Sept., 2. p. 632. N. Du Ham., 7. p. 181.; Smith in Rees's Cycl., No. 81.
Synonyme. The mossy-cup Oak, *Amer.*
Engravings. Michx. Arb., 2. t. 2.; N. Amer. Syl., 1. t. 3.; and our *fig.* 1730.

Spec. Char., &c. Leaves oblong, smooth; glaucous beneath; deeply and unequally pinnatifid. Fruit elliptic ovate, on short footstalks. Calyx cup-shaped, fringed, and nearly covering the acorn. (*Michx.*, adapted.) This tree grows, in America, to the height of from 60 ft. to 70 ft.; and, according to Michaux, it has a spreading head, and an imposing aspect. "The bark is white and laminated; but the tree is chiefly remarkable for the form and disposition of its secondary branches, which are slender and flexible, and always inclined towards the earth. This peculiarity alone," continues Michaux, "would render it a valuable acquisition for parks and gardens." (*N. Amer. Syl.*, i. p. 33.) The leaves are of a light green above, and whitish beneath: they resemble those of the white oak in colour, but differ from them in form; being larger, and very deeply and irregularly laciniated, with rounded lobes, so different in shape, that it is impossible to find two leaves that are alike. The acorns are of an elongated form, and are about three parts enclosed in deep oval cups, the scales of which are prominent and recurved, except near the edge, where they terminate in slender flexible filaments. From this peculiarity, Michaux called the species the mossy-cupped oak. This oak is very rare in America, being only found, according to Michaux, on the banks of the Hudson above Albany, and in Genessee: but Pursh found it on iron ore hills in Pennsylvania and Virginia. Pursh adds that, in general appearance, it resembles Q. macrocárpa. Michaux thinks that the wood, though "not better than that of Q. álba, is far superior to that of Q. rùbra;" but it does not appear that it has been yet applied to any economical uses. It was introduced into England in 1811, but is seldom found in plantations, or even in the nurseries. There are seedling plants of it in the Horticultural Society's Garden; and in some private collections.

1730



♀ 10. Q. MACROCA'RPA *Willd.* The large-fruited *American* Oak.

Identification. Willd. Sp. Pl., 4. p. 453.; Pursh, 2. p. 632.; Michx. Quer., No. 2.; N. Du Ham., 7. p. 182.; Smith in Rees's Cycl., No. 80.
Synonymes. The over-Cup white Oak, Bur Oak, *Amer.*; Chêne à gros Glands, Chêne frisé, *Fr.*; gross-fruchtige Eiche, *Ger.*
Engravings. Michx. Quer., No. 2. t. 2, 3.; N. Amer. Syl., 1. t. 4.; our *fig.* 1731.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves downy beneath, lyrate, deeply and sinuately lobed; the lobes obtuse and spreading, and the upper one much dilated. The calyx deep, cup-shaped, scaly, and fringed with bristles. Acorns thick and ovate. (*Willd.*) This, according to Michaux, is "a beautiful tree, more than 60 ft. high, laden with dark tufted foliage. The leaves are larger than those of any other oak in the United States, being frequently 15 in. long, and 8 in. broad: they are notched near the summit, and deeply laciniated below. The acorns, which are also larger than those of any other American species, are oval, and enclosed for two thirds of their length in a thick rugged cup, which is generally bordered along its upper edge with fine, long, flexible filaments. The bark



1731

of the young branches is frequently covered with a yellowish corky substance, like that which is found on the liquidambar, and some kinds of elm." This oak is found, according to Michaux, in the greatest abundance beyond the Alleghanies, in the fertile districts of Kentucky and West Tennessee; and in Upper Louisana, near the Missouri. According to Pursh, it is found within the mountains, on dry slate or limestone hills; and in Kentucky, Tennessee, and the country of the Illinois; and also on the banks of the Mississippi and the Missouri. The wood, according to Michaux, is inferior to that of the white oak, and is little esteemed in the United States; but, according to Pursh, the wood is excellent. There are trees in the Horticultural Society's Garden, and at Messrs. Loddiges's. The portrait in our last Volume is from the latter.

♀ 11. Q. OBTUSI′LOBA *Michx.* The blunt-lobed-*leaved*, *or Post*, Oak.

Identification. Michx. Quer., No. 1. t. 1.; Pursh, 2. p. 632.; Michx. Arb. Am., 2. p. 36.; Smith in Rees's Cycl., No. 78.

Synonymes. Q. stellàta *Willd. Sp. Pl.*, 4. p. 452., *Ait.*, No. 26., *Wangh. Amer.*, 78. t. 6. f. 15., *N. Du Ham.*, 7. p. 180., Lodd. Cat., ed. 1836; Iron Oak, Box white Oak, American Turkey Oak (so called, because the acorns, which are sweet, are eaten by the wild turkeys), upland white Oak, *Amer.*

Engravings. Michx. Quer., No. 1. t. 1.; Arb. Amer., 2. t. 4.; N. Amer. Syl., 1. t 9.; Wangh. Amer., t. 6. f. 15.; our *fig.* 1732.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves oblong, slightly pubescent beneath, sharply wedge-shaped at the base; lobes obtuse, the lower ones deeply sinuated, and the upper ones dilated, and slightly bilobed. Calyx hemispherical. Fruit oval, and rather smal l. (*Michx.*, adapted



1732

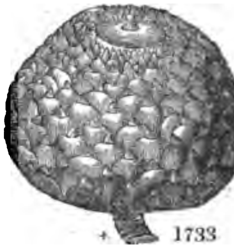
The height of this tree, according to Michaux, rarely exceeds 40 ft., with a trunk not more than 15 in. in diameter, and a head disproportionately large; owing to the "early division of the trunk into limbs, with which the secondary branches form more acute angles than is usual with other trees. The branches are, also, bent into elbows at certain distances, which renders the tree easily distinguishable, even when the branches have fallen." The bark is thin, and of a greyish white. The wood is yellowish, and with no tinge of red. The leaves are on short petioles, and so deeply lobed as to have almost a star-like shape, whence Wangenheim called it Q. stellàta. The upper lobes are much broader than the lower ones; and the leaf is attenuated at its base. The texture is coriaceous, and the colour is a dusky green above, and greyish beneath. In autumn, the ribs assume a rosy tint, but never that purplish red which is observable in those of the scarlet oak. The acorns, which are produced in abundance, are small, oval, and three parts covered with a slightly rugged greyish cup: they are very sweet, and form a delicious food for squirrels and wild turkeys; whence the tree is, in America, often called the turkey oak. "In New Jersey, near the sea, and in the vicinity of Philadelphia,"

says Michaux, "this species is thinly disseminated in the forests, and has hitherto been considered as a variety of the white oak. In Maryland, and a great part of Virginia, where it abounds, it is called the box white oak, and sometimes the iron oak, and the post oak. The last denomination only is used in the Carolinas, Georgia, and East Tennessee." The steep banks of the Hudson, near New York, form its most northern boundary; and even here, Michaux observes, it is only preserved by the influence of the sea air, which somewhat moderates the severity of the winters. It thrives but in a dry, sandy, or gravelly soil, not far from the sea; but it attains its largest size near Baltimore. The farthest point at which it was found to the west, was about 150 miles from Philadelphia, on the road to Pittsburg. It is most abundant in Virginia and Maryland, between the Alleghanies and the sea. "Growing in a less humid soil, its timber is less elastic, but finer grained, stronger, and more durable, than that of the white oak: hence it is preferred, in America, for posts, and is used with advantage by wheelwrights and coopers." (*Michx.*) In ship-building, it is employed principally for the knees, as it seldom produces planks large enough for the sides. The preference given, in the West Indies, to the staves for casks procured from Baltimore and Norfolk is due, in a great measure, to their being made, in those districts, of the post oak. (*Michx.*) Pursh calls this species the upland white, or iron, oak; and says that it is a spreading tree, from 50 ft. to 60 ft. high, the timber of which is of great value in ship-building. It was introduced into England in 1819; and there are plants of it in the Horticultural Society's Garden, and at Messrs. Loddiges's.

¥ 12. Q. LYRA'TA *Walt.* The lyrate, *or over-Cup*, Oak.

Identification. Walt. Carol., 235.; Willd., No. 72.; Ait., No. 27.; Pursh, 2. p. 632.; Michx. Quer., No. 3. t. 4.; N. Du Ham., 7. p. 181.; Smith in Rees's Cycl., No. 79.
Synonymes. Swamp Post Oak, Water white Oak, *Amer.*
Engravings. Michx. Quer., No. 3. t. 4.; and our *figs.* 1733. and 1734.

Spec. Char., &c. Leaves subsessile, glabrous, lyrately sinuated; much contracted in the middle, but dilated at the summit, and attenuated at the base; lobes angular; the upper part of the leaf divided into three lobes, which are tricuspidate at their extremities. Calyx globular, rough, and almost covering the acorn. (*Michx.*) The over-cup oak, according to the younger Michaux, forms a noble tree, of which he has seen specimens, on the banks of the Savannah, more than 80 ft. high, with a trunk from 8 ft. to 12 ft. in circumference. The elder Michaux, however, states its ordinary height to be between 50 ft. and 60 ft. The leaves are from 6 in. to 8 in. long, smooth, narrow, lyre-shaped, deeply sinuated, and borne on short petioles. The lobes, especially the upper ones, are somewhat truncated; and, from the resemblance in this respect to those of the post oak, this species has obtained the name of the swamp post oak. The foliage is thick, and of a light agreeable tint; and the bark is white. The acorns are broad, round, and depressed; and the cups, which are nearly closed over them, are thin and scaly, each scale being terminated by a short firm point, or bristle. (*Michx.*) Pursh, speaking of this tree, says that it is only from 8 ft. to 15 ft. high; but, as all the other writers who have mentioned it describe it as a large tree, with a majestic appearance, and most luxuriant vegetation, Pursh's account of its height is probably a mis-



1733



1734

take. Indeed, the tree of this species in Loddiges's arboretum was upwards of 15 ft. high in 1834. *Q.* lyràta is a native of the southern states of North America; where, according to the younger Michaux, "it is never seen in the long narrow marshes which intersect the pine barrens, but is found exclusively in the great swamps on the borders of the rivers, which are often overflowed at the rising of the waters, and are inaccessible during three quarters of the year." It is not mentioned by Catesby, and appears to have been first described by Walther, in his *Flora Caroliniana*. It was introduced into England in 1786, but is seldom met with in collections. The wood, though inferior to that of the white and post oaks, is more compact than would be supposed from the swampy nature of its native habitat: it will, however, grow on dry soil; and the elder Michaux states that, even in loose sandy soil, it grew faster than any other oak in his nurseries. (*Hist. des Chênes*, No. 3.) The younger Michaux says that "this species is the largest and most highly esteemed among the oaks that grow in wet grounds. The acorns I sent to France, though sown on uplands, have produced flourishing plants, which bear the winter of Paris without injury." (*North Amer. Syl.*, i. p. 42.)

§ iv. *Prìnus.* *Chestnut Oaks.*

Sect. Char., *&c.* Leaves dentate, dying off of a dirty white, or of a yellowish orange. Bark white, rough, and scaly. Fructification annual. Cup imbricate. Nut oblong, generally large.

⸸ 13. *Q.* PRI'NUS *L.* The Prinus, *or Chestnut-leaved*, Oak.

Identification. Lin. Sp. Pl., 1413.; Willd. Sp., 4. p. 439.; Ait. Hort. Kew., 5. p. 290.; N. Du Ham., 7. p. 164.; Michx. Fl. Bor. Amer., 2. p. 195.

Spec. Char., *&c.* Leaves oblong-oval, more or less pointed, nearly equally toothed. Cup somewhat scaly; nut ovate. (*Michx. Fl. Bor. Amer.*, ii. p. 195.) Trees, varying in height from 20 ft. to 90 ft.; and one of the varieties a low shrub. In the climate of London the trees grow freely, and promise to attain a considerable size. In general form, they are as handsome as any of the American oaks; but their foliage dies off with very little colour, what there is being generally of a whitish or brownish yellow.

Varieties. These are by some authors treated as species; but they are so obviously alike in their leaves and bark from their infancy upwards, that there does not remain a single doubt in our minds of their being only varieties. However, for the sake of those who think otherwise, and also to mark the peculiarities of each variety, we shall give the identifications, synonymes, and descriptions to each.

⸸ *Q.* P. 1 *palústris* Michx. Fl. Bor. Amer., ii. p. 196., Quer., No. 5. t. 6., Lodd. Cat., ed. 1836; *Q. P.* palústris *Michx. N. Amer. Syl.*, i. p. 46. t. 8., our *fig.* 1735., and the plate of this tree in our last Volume; *Q.* Prìnos *L. Sp. Pl.*, 1413., *Willd. Sp. Pl.*, p. 439., *Ait. Hort. Kew.*, v. p. 290., *Pursh Fl. Amer. Sept.*, ii. p. 633., *N. Du Ham.*, vii. p. 164., *Smith* in *Rees's Cycl.*, No. 47.; Q. castaneæfòliis, &c., *Pluk. Alm.*, 309., *Phyt.*, t. 54., *Cat. Carol.*, i. t. 18. The Swamp Chestnut Oak, the Chestnut white Oak; and, near Philadelphia, the white Oak. — Leaves on longish footstalks, obovate. Fruit very large. Cup moderately hollow, distinctly scaly. (*A. Michx.*) This tree, according to the younger Michaux, is, in the southern states of North America, generally from 80 ft. to 90 ft. high, with a straight trunk, rising clear of branches, and of nearly the same thickness to the height of 50 ft.; then spreading into a broad tufted head; and forming altogether one of the most beautiful and majestic trees of the American forests. The leaves of *Q. P.* palústris are of a shining green above, and whitish and somewhat wrinkled underneath; they have rather long footstalks; and are from 8 in. to 9 in. long, and from 4 in. to 5 in. broad; obovate, and terminating in an acute point.

They are somewhat wedge-shaped, and are deeply dentated with blunt lobe-like teeth from the summit to the base. The acorns are of a bright clear brown, oval, and larger than those of any other kindof American oak, except Q. macrocárpa: they are borne on very short peduncles, and are contained in shallow scaly cups: they are sweet, and are sometimes pro-



1735

duced in great abundance. The swamp chestnut oak is found occasionally within a few miles of Philadelphia; but it is in the greatest abundance in the maritime parts of the Carolinas, Georgia, and East Florida. It grows only in the large swamps which border the rivers, or that are enclosed in the forests, and "always in spots that are rarely inundated, and where the soil is loose, deep, constantly cool, and luxuriantly fertile." (*N. Amer. Syl.*) In the Carolinas and Georgia, it is usually accompanied by *U'lmus* americàna and *U.* alàta, *Magnòlia* grandiflòra and M. tripétala, the beech, poplar, hickory, &c." It was the first of the chestnut oaks observed by European botanists, being supposed to be that described and figured by Plukenet in 1691, and by Catesby in 1731. There appears, however, some discrepancy between their descriptions; Plukenet stating that his oak had red veins to the leaves, which Catesby says his oak had not. It was introduced before 1730, as it was included in the catalogue of the gardeners published in that year (see p. 68.); and it was one of the oaks stated by Catesby to be, in his time, "growing at Mr. Fairchild's." There are trees of this oak at Messrs. Loddiges's, and in the Horticultural Society's Garden. The wood of this tree is considered, in America, to be inferior to that of Q. álba, Q. obtusíloba, and even Q. macrocárpa, though it is superior to the wood of the American oaks comprised in the division Rùbræ. It is too porous for casks to contain wine or spirituous liquors; but it is used by wheelwrights, and for other works which require strength and some durability. "As it splits in a straight line, and may be divided into fine shreds, it is chosen by the negroes for baskets and brooms." As posts and rails, it will last about 12 or 15 years, which is one third longer than the wood of the willow oak will remain undecayed, when applied to similar purposes. In Georgia, the wood of the swamp chestnut oak is considered to make the best fuel. The acorns are extremely sweet, and, in the American woods, are greedily devoured by deer, cows, horses, and swine. The principal merit of the tree, however, according to the younger Michaux, consists in its noble and majestic appearance, and in the extraordinary beauty of its foliage.

¶ Q. P. 2 *montícola* Michx. Fl. Bor. Amer., ii. p. 196., Quer., No. 5. t. 7., and our *fig.* 1736., Lodd. Cat., ed. 1836; *Q. P.* montícola *Michx. fil. N. Amer. Syl.*, i. p. 49. t. 9., *Q.* montàna *Willd. Sp. Pl.*, iv. p. 440., *Pursh Fl. Amer. Sept.*, ii. p. 634., *N. Du Ham.*, vii. p. 165., *Smith* in *Rees's Cycl.*, No. 49., *Lodd. Cat.*, ed. 1836; *Q.* Prìnus *Smith* in *Abb. Ins. of Geor.*, ii. p. 163. t. 82. The Rock Chestnut Oak. — Leaves on short footstalks, rhomboid-oval. Fruit rather large; cup top-shaped and rough; nut oblong. (*Michx.*) The beautiful appearance of this tree, according to the younger Michaux, "when growing in a fertile soil, is owing equally to the symmetry of its form and the

luxuriance of its foliage." It is sometimes found 60 ft. high, with a trunk about 3 ft. in diameter; but, as it generally grows in poor rocky soil, it very seldom attains these dimensions. In open elevated situations, it spreads widely, and forms a head like that of an apple tree. The bark on old trees is hard, thick, and deeply furrowed; and the outer bark is equally good for tanning as the inner bark. The wood is reddish, like that of the white oak; and, though its pores are more open, its specific gravity is greater, a piece of its wood sinking in water, while a piece of the same size of *Q. álba* will swim. The leaves, in America, are 5 in. or 6 in. long, and 3 in. or 4 in. broad; oval, and uniformly dentate, with the teeth more regular, but less acute, than those of *Q. P. palústris*; the leaf terminating in a point. When beginning to unfold in spring, the leaves are covered with a thick white down, and they appear somewhat wrinkled; but, when fully expanded, they are perfectly glabrous, smooth, and of a delicate texture. The petiole, which is rather short, is yellow, and the colour becomes brighter and more conspicuous in autumn. The acorns are long, of an oblong-oval shape: they are produced in pairs, on a short peduncle, and are enveloped for about one third of their length in pear-shaped cups, covered with loose scales. They are sweet, and of a clear light brown colour. This oak, according to the younger Michaux, is not one of those which grow promiscuously with other trees in forests; but it is found in small patches, in particular habitats, only on high grounds, thickly strewed with stones, or covered with rocks. "Thus it is often seen on the steep and rocky banks of the Hudson, and on the shores of Lake Champlain; and still more frequently on the Alleghanies, in Pennsylvania and Virginia." On these mountains, it is sometimes found where the soil is so meagre, that the trees do not exceed 20 ft. or 25 ft. in height, and their trunks 8 in. or 10 in. in diameter. In Pennsylvania, Virginia, and Maryland, this species is known by the name of the chestnut oak; while on the banks of the Hudson it is called the rock oak; and the younger Michaux, combining the two names, calls it the rock chestnut oak. It was introduced in 1800; and there are trees in the Horticultural Society's Garden, and at Messrs. Loddiges's. The wood, though too porous to be used as staves for casks to contain spirituous liquors, is esteemed, in New York, next to that of the white oak for the construction of ships. It is employed for the knees and frames; pieces adapted for which are rarely to be obtained from the white oak; while the rock chestnut oak, "growing up," as Michaux says, "in a continual controversy with the winds," produces a great number of twisted and crooked branches, or large limbs, perfectly well adapted for the purpose. It is also considered superior to any other species, except the live oak, for fuel. The bark, at New York and in Pennsylvania, is esteemed the best for tanning; but only that of the secondary branches, and of the trunks of young trees, is employed. Michaux suggests that the tree might grow in exposed rocky places in Europe, where the acorns might be dropped in crevices in the rocks, or planted in barren places, where the soil appears incapable of other cultivation.



1736

‡ Q. P. 3 *acumináta* Michx. Fl. Bor. Amer., ii. p. 196., Quer., No. 5. t. 8., and our *fig.* 1737.; *Q. P.* acumináta *Michx. fil. N. Amer. Syl.*, i. p. 51. t. 10.; *Q.* Castànea *Willd. Sp. Pl.*, iv. p. 441., *Pursh Fl. Amer. Sept.*, ii. p. 634., *N. Du Ham.*, vii. p. 167., *Smith* in *Rees's Cycl.*, N. 51., *Lodd. Cat.*, ed. 1836. The yellow Oak. — Leaves on long footstalks; obtuse at the base, sharply serrated. Fruit of moderate size; cup hemispherical. (*Michx.*) The yellow oak, according to the younger Michaux, is a fastigiate-growing tree, from 70 ft. to 80 ft. high, and with a trunk about 2 ft. in diameter. The bark is whitish, very slightly furrowed, and sometimes divided into plates. The wood is yellowish; but the tint is not sufficiently bright to entitle it to rank among the ornamental woods. The leaves are lanceolate, obtuse at the base, and ending in a sharp point, regularly toothed, of a light green above, and whitish beneath. The acorns are small, roundish-ovate, and contained in shallow slightly scaly cups: they are considered sweeter than those of any other kind of oak in the United States. It is generally found in the middle and western states, taking the banks of the Delaware for its northern boundary, and those of the Savannah for its southern. It is, however, very thinly disseminated, and is frequently lost sight of for several days' journey, even in those states where it is most plentiful. From its comparative rareness, it does not appear to have been applied to any uses in the arts; and Michaux says that the pores in its wood are so irregularly disposed, and so numerous, that the wood would probably possess very little of either strength or durability. The tree is, however, very ornamental from its beautiful foliage, and fastigiate habit of growth. It was introduced in 1822; and there are plants at Messrs. Loddiges's.



1637

‡ Q. P. 4 *pùmila* Michx. Fl. Bor. Amer., ii. p. 196., Quer., No. 5. t. 9. f. 1.; *Q. P. Chinquapin* Michx. fil. Arb., ii. p. 65. t. 10., N. Amer. Syl., i. p. 55. t. 11., and our *fig.* 1738.; *Q. Chinquapin* Pursh Fl. Amer. Sept., ii. p. 634., Smith in Rees's Cycl., No. 48.; *Q.* prinoïdes *Willd. Sp. Pl.*, iv. p. 440., *N. Du Ham.*, vii. p. 166. The Chinquapin, or Dwarf Chestnut, Oak. — Leaves on shortish petioles; somewhat lanceolate; glaucous beneath. (*Michx.*) The dwarf chestnut oak is one of the smallest of the genus, as, according to the younger Michaux, it rarely exceeds 30 in. in height; though Pursh says it grows to the height of 3 ft. or 4 ft. The leaves are oval-acuminate, regularly, but not deeply, dentated, of a light green above, and whitish beneath. The acorns are enclosed, for about one third of their length, in scaly sessile cups: they are of the middle size, somewhat elongated, similarly rounded at both ends, and very sweet. Nature seems to have sought to compensate for the diminutive size of this shrub by the abundance of its fruit: the stem, which is sometimes no bigger than a quill, is stretched at full length upon the ground by the weight of its thickly clustering acorns. (*N. Amer. Syl.*, i. p. 56.) This shrub grows most abundantly in the northern and middle states of North America, and is usually found



1738

in particular districts of very poor soil, where, alone or mingled with the bear oak (*Q.* Banísteri), it sometimes covers tracts of more than 100 acres in extent. It was introduced in 1823; but is rarely to be met with in plantations. Pursh states that it is highly ornamental when in full bloom; and Michaux observes that it might probably be cultivated along with *Q.* Banísteri for its fruit, which, as before observed, is very sweet. From the small size of the plant, this variety is well deserving of culture for suburban or small villa gardens, and miniature arboretums.

¥ *Q.* P. 5 *tomentòsa* Michx. Fl. Bor. Amer., ii. p. 196., Quer., No. 5. t. 9. f. 2.; *Q. P.* díscolor *Michx. fil. Arb.*, ii. p. 46. t. 6., *N. Amer. Syl.*, i. p. 43. t. 7., and our *fig.* 1739., *Lodd. Cat.*, ed. 1836; *Q.* bícolor *Willd. Sp. Pl.*, iv. p. 440., *Pursh Fl. Amer. Sept.*, ii. p. 633., *N. Du Ham.*, vii. p. 165., *Smith* in *Rees's Cycl.*, No. 50.; *Q.* Michaúxi Nutt. The Swamp white Oak.—Leaves almost sessile, obtusely oval, bluntly toothed; downy beneath. (*Michx.*) The swamp white oak, in America, says the younger Michaux, is a beautiful tree, more than 70 ft. high, of a vigorous habit of growth, and with luxuriant foliage. The leaves are from 6 in. to 8 in. long, and 4 in. broad; entire towards the base, which is attenuated and wedge-shaped; but dilated and coarsely toothed for two thirds of their length.

1739



The tree is distinguished, when full grown, by the remarkable appearance of its leaves, which are on the under side silky, and and of a silvery whiteness; while the upper side is smooth, and of a bright green. It was from this striking contrast that Dr. Mühlenberg gave this tree the specific name of díscolor. The acorns are sweet, but seldom abundant; they are long, of a clear chestnut brown, and contained in rather shallow scaly cups, edged with short slender filaments. These cups are "more downy within than those of any other oak;" and they are borne in pairs, on peduncles of from 1 in. to 2 in. in length. The bark is scaly, and of a greenish white. With the exception of the district of Maine, and the maritime parts of the southern provinces, Michaux informs us that this oak is diffused throughout the whole of the United States. "In comparison, however, with several other species, it is not common, being found only on the edges of swamps, and in wet places exposed to inundations, and not in the forests at large." It generally grows in company with *Q.* palústris, *A*'cer rùbrum, *N*ýssa aquática, and *C*àrya álba; and, in British plantations, would thrive in the same situations as the alder and poplar. This species appears to have been discovered by the elder Michaux, who has figured a leaf of it under the name of *Q. P.* tomentòsa; but when it was introduced into Britain is uncertain, though, in all probability, it would be about the same time as *Q. P.* montícola, viz. in 1800. The wood is strong, elastic, and heavier than that of the white oak. In full-grown trees, the grain is fine and close, and the pores are not visible to the naked eye: it splits easily, and in a straight line; and, according to Michaux, it is esteemed next in quality to the American white oak, though, from its rareness, it is but seldom employed for economical purposes. There is a tree of this species in the arboretum at Messrs. Loddiges's, and one in the Horticultural Society's Garden, under

the name of Q. bícolor, of which the plate of this tree in our last Volume is a portrait.

§ v. *Rùbræ.* *Red American Oaks.*

Sect. Char. Leaves deeply lobed, sinuated, multifid, and mucronated. Bark dark, and not scaling off. Fructification biennial. Nut ovate, with a persistent style. Cup imbricate, large in proportion to the nut. Trees, varying from 80 ft. or 90 ft. to 15 ft. or 20 ft. in height; remarkable for the bright red, deep scarlet, or dark purple, of their foliage, when it dies off in autumn. Perhaps most of the kinds in this section might be reduced to two or three species; but, as they come up tolerably true from seed, we have considered it more convenient for the cultivator to treat them as distinct. The hardiest and most rapid-growing, and at the same time the most elegant and ornamental, tree of the section is Q. palústris, which, with its spreading drooping branches, and its straight erect trunk and spiry top, is, independently of its lively scarlet, orange, and red colours in spring and autumn, in our opinion, the most graceful of all oaks, either European or American.

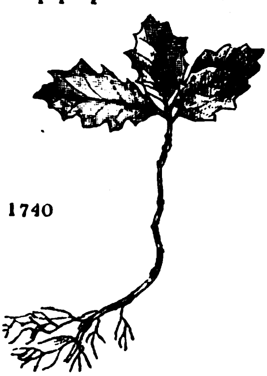
♀ 14. Q. RU'BRA *L.* The red, *or Champion*, Oak.

Identification. Lin. Sp. Pl., 1413.; Willd. Sp. Pl., 4. p. 445.; Ait. Hort. Kew., 5. p. 292.; Pursh Fl. Amer. Sept., 2. p. 630.; Michx. Quer., No. 20.; Smith in Abb. Ins., 2. p. 105.; N. Du Ham., 7. p. 170.; Smith in Rees's Cycl., No. 60.
Synonyme. Q. Æ'sculi divisurâ, &c., *Pluk. Phyt.*, t. 54. f. 4.
Engravings. Pluk. Phyt., t. 54. f. 4.; Michx. Quer., t. 35, 36.; North Amer. Syl., 2. t. 28.; our *figs.* 1740. to 1744.; and the plates of this species in our last Volume.

Spec. Char., &c. Leaves smooth, oblong, sinuated, on long stalks; lobes acute sharply toothed, bristle-pointed. Calyx of the fruit flat underneath. Nut ovate. (*Willd.*) A tree 80 ft. or 90 ft. in height. Introduced in 1739.

Varieties. Aiton, in the *Hortus Kewensis*, 2d ed., mentions two varieties: Q. rùbra latifòlia, the champion oak, which is the Q. rùbra of Linnæus; and Q. rùbra montàna, the mountain red oak.

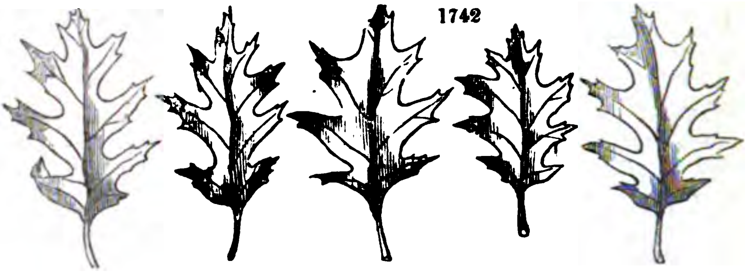
Description, &c. The red oak is, in America, a tall widely spreading tree, frequently more than 80 ft. high, and with a trunk 3 ft. or 4 ft. in diameter. The bark is comparatively smooth, of a dark colour, very thick; and, though in old trees it cracks, yet it never scales off as in the sections A'lbæ and Prìnus. The wood is reddish and coarse-grained; and its pores are often so large as to admit the entrance of a hair. The leaves, when they first come out in spring, are of a fine sulphur colour; when fully expanded, they are smooth and shining on both sides, large, deeply laciniated, and sometimes slightly rounded at the base, especially on old trees; and, before they fall, they turn of a deep purplish red. According to the younger Michaux, the leaves on old


1740


1741

trees often nearly resemble those of Q. falcàta. The leaves of Q. falcàta are, however, always downy beneath; while those of Q. rùbra are smooth.

1742



The leaves of *Q.* rùbra die off of a more purplish red than those of most of the other kinds in this section; but they often become yellow before they fall. They vary much in shape, from the age of the plant, or the soil and situation in which it has grown. *Fig.* 1740., copied from the elder Michaux's *Histoire des Chênes*, shows the leaves of a seedling a year old; *fig.* 1741., from the same work, those of a tree bearing acorns; *fig.* 1742. shows several leaves gathered from trees in England of four or five years' growth; *fig.* 1743. is drawn from a specimen taken from a tree in the Horticultural Society's Garden; and *fig.* 1744. is a leaf from the splendid full-grown tree in the Fulham Nursery, of which there is a portrait in our last Volume. By comparing the plates of the trees of this species in our last Volume, it will be seen how exceedingly the leaves vary. The acorns are sessile, or on very short peduncles; they are large, and are produced in great abundance; they are rounded at the summit, and compressed at the base; and they are contained in flat very shallow cups, covered with narrow compact scales. The red oak is one of the most common species in Canada, and the whole of the north of the United States. In the states of New York, New Jersey, part of Philadelphia, and along the whole range of the Alleghanics, it is nearly as abundant as *Q.* coccínea and *Q.* tinctòria; but it is much less common in the more southern states, its perfect developement requiring a cool climate and a fertile soil. The red oak was introduced into France about 1740, and was first planted on the estate of Du Hamel, at Pittriviers. In England, the first notice that we find of the red oak is, that it was cultivated by Miller in 1739. Since

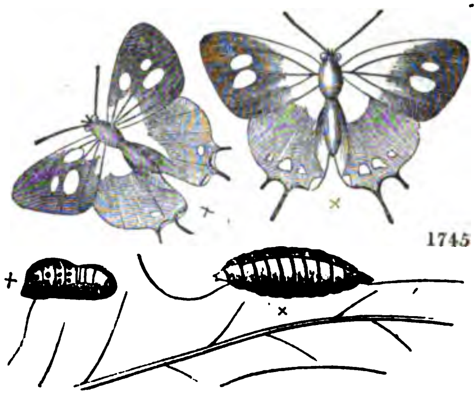
1744



1743



that time it has, perhaps, been more generally planted than any other of the American oaks, though full-grown specimens of it are not very numerous. The largest which we know of near London, is at Syon, where it is 57 ft. high; and the largest in England is at Strathfieldsaye, where it is 100 ft. high. Several trees in the neighbourhood of London, and particularly one at Purser's Cross which is upwards of 40 ft. high, ripen acorns, from which young plants have been raised. The wood is so coarse and porous as to be of scarcely any use in the arts. It is, however, employed in America for the staves of flour and sugar casks, or to contain any kind of dry goods. The bark contains a large proportion of tannin, and is very extensively used by tanners in the United States. The acorns are voraciously eaten by wild animals, and also by the cows, horses, and swine that are allowed to range in the woods after the herbage has perished. *Papílio* (*Thècla*) *Favònius* Abb. and Smith, t. 14., and our *fig.* 1745., the brown hair-streak butterfly, feeds on the leaves of this species.



1745

Statistics. In the environs of London, at Syon, it is 57 ft. high, the diameter of the trunk 2 ft., and of the head 55 ft.; in the Fulham Nursery, and at Purser's Cross, it is 40 ft high. There are various other trees of nearly similar dimensions; but as, from the description sent to us, we have been unable to determine whether the tree belongs to *Q.* rùbra or *Q.* coccìnea, we have not inserted them under the statistics of either species. In Hampshire, at Strathfieldsaye, it is above 100 ft. high, with a trunk 3 ft. 6 in. in diameter; it grows in a deep rich loam, on the flat bank of the river Loddon: in Wiltshire, at Longleat, 70 years planted, it is 50 ft. high; the diameter of the trunk 2 ft. 2 in., and of the head 54 ft.: in Radnorshire, at Maeslaugh Castle, 44 ft. high; the diameter of the trunk 3 ft., and of the head 45 ft. In Scotland, in Aberdeenshire, at Gordon Castle, 20 ft. high, with a trunk 6 in. in diameter. In Ireland, at Castletown, 30 ft. high, the diameter of the head 38 ft.; in Fermanagh, at Florence Court, 30 years planted, it is 32 ft. high, the diameter of the head 30 ft. In France, at Rambouillet and other places, are many fine trees, varying from 40 ft. to 60 ft. in height, both of *Q.* rùbra and *Q.* coccìnea. (See *Gard. Mag.*, vol. xi. p. 42.) Bosc mentions a superb tree at the Petit Trianon, of which, however, we have not been able to procure the dimensions. In Brittany, at Barres, 14 years planted, it is 14 ft. high; near Nantes, 90 years old, it is 40 ft. high, with a trunk 4 ft. in diameter. In Saxony, at Wörlitz, 60 years old, it is 50 ft. high, with a trunk 2 ft. 6 in. in diameter. In Austria, at Vienna, at Laxenburg, 26 years old, it is 25 ft. high; diameter of the trunk 10 in., and of the head 18 ft. In Prussia, at Berlin, in the Botanic Garden, 50 years old, it is 60 ft. high; the diameter of the trunk 3 ft., and of the head 28 ft. In Italy, in Lombardy, at Monza, 24 years planted, it is 50 ft. high; the diameter of the trunk 6 in., and of the head 24 ft.

♀ 15. *Q.* COCCI'NEA *Willd.* The scarlet Oak.

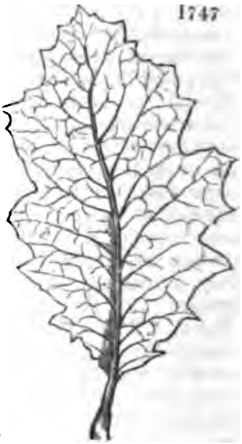
Identification. Wang. Forst., p. 44.; Michx. Fl. Bor. Amer., 2. p. 199.; Willd. Sp. Pl., 4. 446.; Ait. Hort. Kew., 5. p. 292.; Pursh Fl. Amer. Sept., 2. p. 630.; Michx. Quer., No. 18.; N. Du Ham., 7. p. 171.; Smith in Rees's Cycl., No. 61.
Synonyme. *Q.* rùbra β *Ait.*, ed. 1., 3. p. 357.
Engravings. Wang. Forst., t. 9.; Michx. Quer., t. 31, 32.; N. Amer. Syl., 1. t. 25.; our *figs.* 1746, 1747, and 1748.; and the plate of this tree in our last Volume.

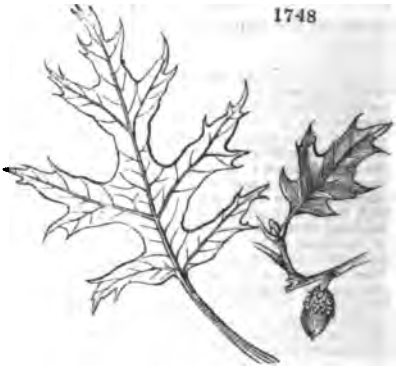
Spec. Char. &c. Leaves smooth, oblong, deeply and widely sinuated, on long stalks; lobes divaricated, acute, sharply toothed, bristle-pointed. Calyx of the fruit turbinate, half as long as the nut. (*Willd.*) A tree, 80 ft. high. Introduced in 1691.

Description, &c. The scarlet oak is, in America, a tree of more than 80 ft. high, with a trunk 3 ft. or 4 ft. in diameter. The tree is of a more rigid habit of growth than *Q.* rùbra, the branches of which are very flexible. The bark is dark-coloured, entire, and very thick; and the wood is reddish and coarse-grained, with very open pores. The leaves, which have long petioles, are of a beautiful green, shining on both sides; and, on old trees, laciniated in a very remarkable manner, having usually four deep sinuses on each side, very broad at bottom. The leaves begin to change with the first cold, and, after

several successive frosts, turn to a brilliant scarlet, instead of the dull red of those of Q. rùbra. These leaves differ very greatly in shape at different stages in the growth of the tree. When quite young, they are scarcely lobed at all, as may be seen by *fig.* 1746., which is taken from Michaux's *Histoire des Chênes*, and represents a seedling a year old. *Fig.* 1747. is a leaf taken from a tree in the Horticultural Society's Garden; and *fig.* 1748., a sprig and acorn from an old tree copied from Michaux. Amidst all the varieties, however, in the shape of the leaf of the scarlet oak, it may always be distinguished from that of Q. rùbra by the different hue which it assumes in autumn; the colour of Q. coccínea being always a bright scarlet, or yellowish red, of more or less intensity; and that of Q. rùbra a dull crimson, or purplish red. The leaf is also larger, and the indentations in old leaves rounder. The acorns are large, somewhat elongated, similarly rounded at both ends, and half-covered with scaly top-shaped cups. As the fruit of this tree varies in size with the quality of the soil, it is difficult to distinguish it from that of Q. tinctòria: the only constant difference is, that the kernel of the nut is always yellowish in Q. tinctòria, and always white in Q. coccínea. The difference between the scarlet oak and the red oak appears to be about as great as that which exists between two very distinct varieties of apple and pear: for example, the nonpareil and the golden pippin, or the jargonelle and the summer bergamot. These oaks are not, however, on that account the less worthy of being kept quite distinct; for it must always be recollected, that some of the finest plants in every department of culture are the varieties of species, and not the species themselves. The scarlet oak, in the climate of London, and in Europe generally, may be considered as of equal hardiness and rapidity of growth with the red oak. The largest tree of it which we have seen, and know to be certainly of the scarlet oak, is at Syon, where it is 77 ft. high, with a trunk 2 ft. 9 in. in diameter.


1746


1747


1748

Geography, History, &c. The scarlet oak, says the younger Michaux, is first seen in the vicinity of Boston; but it is most abundant in New Jersey, Pennsylvania, and the upper part of the Carolinas and Georgia. In the northern states, it is often confounded with Q. rùbra, and in those of the south with Q. falcàta. The scarlet oak was one of those discovered by Banister, and included in his catalogue dated 1680. It was probably sent here by him to his patron, Bishop Compton (see p. 44.); as we are informed, by the *Hortus Kewensis*, that there was a plant of it in the bishop's garden in 1691. It was, at first, supposed to be only a variety of Q. rùbra, and it is mentioned as such in the first

edition of the *Hortus Kewensis* (iii. p. 357.). Wangenheim was the first author who distinguished it as a species. It was one of the plants sent to France by the elder Michaux in 1786, and formed part of the plantations at Rambouillet; where, we are informed by the younger Michaux, there was a tree of it which, about 1819, was 45 ft. high. (See p. 141.)

Properties and Uses. The wood of the scarlet oak is of very little value in the arts, and it makes very poor fuel. It decays rapidly, and is too porous to contain wine or spirits. The principal use made of it in America is for staves to make casks for dry goods. The bark is employed in tanning, but is not equal to that of the Q. rùbra. This tree produces galls, which, in America, are applied to the same purposes as the European galls of commerce. In landscape-gardening, the scarlet oak, like most of the other kinds of this section, is particularly adapted for planting in the margins of woods or groves on a flat surface; or for scattering in irregular masses throughout a wood on a declivity, the surface of which is seen from below. For small groups near the eye it is also well adapted; though the beauty of the foliage of young trees must be acknowledged to be inferior to that of Q. rùbra and Q. falcàta. The long footstalks of the leaves, and the absence of deep sinuosities in the leaves of young trees, give, with reference to picturesque effect, Q. coccínea the same relation to Q. rùbra that Q. sessiliflòra has to Q. pedunculàta.

Statistics. In the environs of London, at Syon, 77 ft. high, the diameter of the trunk 2 ft. 9 in., and of the head 44 ft.; at Kenwood, Hampstead, 38 years planted, it is 50 ft. high, the diameter of the trunk 1 ft. 11 in., and of the head 40 ft. In Devonshire, at Bystock Park, 22 years planted, it is 25 ft. high: in Hampshire, at Strathfieldsaye, it is 90 ft. high, diameter of the trunk 3 ft. 4 in., and of the head 54 ft.: in Somersetshire, at Hurton House, 15 years planted, it is 20 ft. high; at Mamhead, 30 ft. high, with a trunk 2 ft. 3 in. in diameter; some leaves of this tree which were sent to us measured 8½ in. across, and 14 in. in length: in Surrey, at St. Ann's Hill, 30 years planted, it is 56 ft. high, the diameter of the trunk 7 ft., and of the head 48 ft.; at Oakham, 42 years planted, it is 60 ft. high; and at Deepdene, 10 years planted, it is 18 ft. high: in Sussex, at Kidbrooke, 25 years planted, it is 14 ft. high, the diameter of the trunk 6 in., and of the head 16 ft.: in Wiltshire, at Wardour Castle, 30 years planted, it is 45 ft. high, diameter of the trunk 2 ft., and of the head 30 ft.; at Longford Castle, it is 60 ft. high, diameter of the trunk 3 ft. 6 in., and of the head 77 ft.: in Hertfordshire, at Oldenham, 34 years planted, it is 50 ft. high, the diameter of the head 20 ft.: in Lancashire, at Latham House, 30 years planted, it is 36 ft. high, the diameter of the trunk 16 in., and of the head 36 ft.: in Pembrokeshire, at Stackpole Court, 30 years planted, it is 20 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 15 ft.: in Warwickshire, at Combe Abbey, 60 years planted, it is 70 ft. high, the diameter of the trunk 2 ft. 9 in., and of the head 61 ft.; at Springfield, 30 years planted, it is 29 ft. high, the diameter of the trunk 7 in.; and at Allesley, 26 years planted, it is 40 ft. high, the diameter of the trunk 1 ft.: in Worcestershire, at Croome, 75 years planted, it is 90 ft. high, the diameter of the trunk 2 ft., and of the head 30 ft.: in Yorkshire, at Ripley Castle, 16 years planted, it is 28 ft. high, the diameter of the trunk 9 in., and of the head 10 ft.; at Knedlington, near Howden, 10 years from the acorn, it is from 14 ft. to 16 ft high, the diameter of the trunk 2 ft. 6 in., and of the head 11 ft. In Scotland, in Ross-shire, at Brahan Castle, it is 55 ft. high, the diameter of the trunk 1 ft. 8 in., and of the head 30 ft. In Germany, in Cassel, at Wilhelmshoe, 50 years old, it is 6 ft. high. In Austria, at Vienna, in Rosenthal's Nursery, 17 years old, it is 24 ft. high; the diameter of the trunk 11 in., and of the head 23 ft. In France, at Rambouillet, it is 50 ft. high. In Italy, in Lombardy, at Monza, 16 years planted, it is 16 ft. high, the diameter of the trunk 4 in., and of the head 10 ft.

♆ 16. Q. AMBI'GUA *Willd.* The ambiguous, *or grey*, Oak.

Identification. Michx. Arb., 2. p. 120.; North Amer. Syl., 1. p. 98.; Pursh Fl. Amer. Sept., 2. p. 630., not Humboldt.
Synonyme. Q. boreàlis *Michx. N. Amer. Syl.*, 1. p. 98.
Engravings. Michx. Arb., t. 24., N. Amer. Syl., 1. t. 26.; our *fig.* 1749.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves sinuated, glabrous, acute at the base; sinuses somewhat acute. Cup somewhat shield-shaped. Nut roundish-ovate. (*Michx.*) A tree, varying from 40 ft. to 60 ft. high. Introduced in 1800.

Description, &c. The grey oak, according to the younger Michaux, forms, in America, a tree from 40 ft. to 60 ft. high, and with a trunk 1 ft. 6 in. in diameter. It bears a close analogy to the red oak in its foliage, and to the scarlet oak in its fruit; whence Michaux has given it the specific name of ambígua. It has also another peculiarity, in blossoming every year, though it takes two, three, and, in very cold climates, four years to mature its fruit. The leaves are large, smooth, and deeply sinuated; the indentations being sharper and more angular than those of the leaves of Q. coccínea. The acorns are of the middle size, rounded at the end, and contained in scaly top-shaped cups. The grey oak is found farther north than any other American species. The elder Michaux found it on the St. Lawrence, near Quebec, in N. lat. 47° 50'.

1749



Under that parallel, and at Halifax, in Nova Scotia, it is only 40 ft. high; but it increases in size as it gets farther south, till, on the shores of Lake Champlain, it often attains the height of 60 ft. It was first described by the younger Michaux, and was introduced into England by the Messrs. Fraser, in 1800. From its geographical range, it is evidently fitter for the colder parts of Europe than either the preceding or following sorts. Plants, in the neighbourhood of London, grow vigorously; and, from their very large foliage, make a fine appearance, even when young. This kind must not be confounded with the *Q.* ambígua of Humboldt, which is a native of Mexico, and a totally different plant (see App. viii. *Mexican Oaks*); nor with a tree marked (in 1836) *Q.* ambígua in the Horticultural Society's Garden, which is intermediate between *Q.* sessiliflòra and *Q.* pedunculàta, and may be called *Q.* Ròbur ambíguum, as this may be called *Q.* rùbra ambígua. There are trees of the true North American kind in the Horticultural Society's Garden, of one of which the plate of this species in our last Volume is a portrait. The wood is as coarse and open in its pores as that of the red oak; but it is stronger and more durable; and, though unfit for wine casks, it is sometimes employed, in Canada, for the knees of schooners, and other small vessels, and by wheelwrights. As a tree to introduce occasionally in hanging woods in the Highlands of Scotland, along with the British oak, no species can be more desirable than *Q.* ambígua.

♀ 17. *Q.* FALCA'TA *Michx*. The sickle-shaped, *or Spanish*, Oak.

Identification. Michx. Quer., No. 16.; Pursh Fl. Amer. Sept., 2. p. 631.; N. Du Ham., 7. p. 169.; Lodd. Cat., ed. 1836.

Synonymes. *Q.* discolor *Ait. Hort. Kew.*, ed. 1., 3. p. 358.; *Q.* elongàta *Willd. Sp. Pl.*, 4. p. 444., *Ait. Hort. Kew.*, ed. 2., 5. p. 291., *Smith* in *Rees's Cycl.*, No. 57.; *Q.* lyràta *Lodd. Cat.*, 1836; *Q.* cuneàta *Wang.*; *Q.* tríloba *Willd. Sp. Pl.*, 4. p. 443., *Michx. Quer.*, 14. No. 26.; *Q.* cuneàta *Wang. Forst.*; the downy-leaved Oak.

Engravings. Michx. Quer., t. 28.; N. Amer. Syl., 1. t. 23.; and our *figs.* 1750. and 1751.

Spec. Char., &c. Leaves downy beneath, sinuated, with three or more somewhat falcate bristle-pointed lobes; the terminal one elongated and jagged. Calyx hemispherical. (*Willd.*) A tree, varying from 30 ft. to 80 ft. high. Introduced, under the name of *Q.* elongàta, in 1763; and again, under that of *Q.* tríloba, in 1800.

Description, &c. This oak is a very remarkable one, from the great difference which exists in its leaves and general appearance, in different climates. This difference is so extraordinary, that nearly all the botanists who have written on the American oaks have supposed it to be two species. In the south-

ern states, it forms a noble tree, 80 ft. high, with a trunk 4 ft. or 5 ft. in diameter; while in New Jersey the tree is never above 30 ft. high, with a trunk only 4 in. or 5 in. thick. The bark is thick, black, and deeply furrowed; and the wood is reddish and coarse-grained, with open pores, like that of the red oak. The leaves are also extremely different: on the trees in the south, they are falcate, like those in *fig.* 1750., copied from the plate of this tree in the *North American Sylva*, i. t. 23. In New Jersey, the leaves are three-lobed (like those shown in *fig.* 1751., from the *Histoire des Chênes*), except a few on the summit, which are slightly falcated. Generally, the lower branches of all trees of

1750



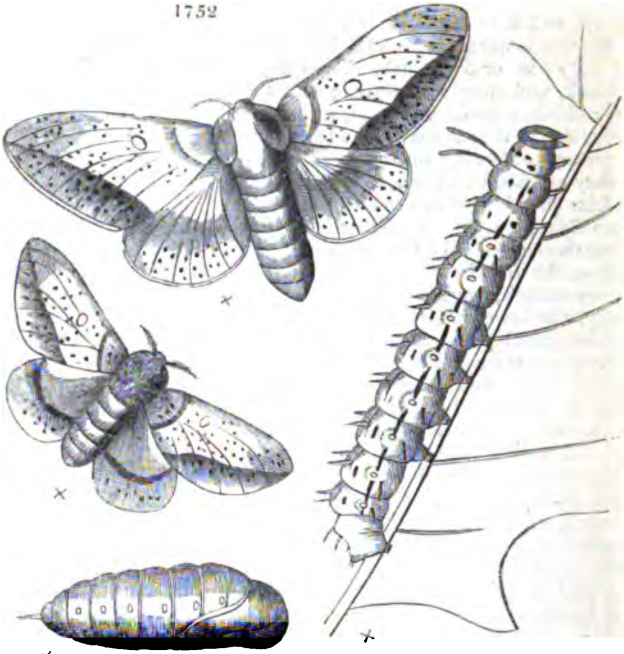
this species, growing in moist and shaded situations, have their leaves trilobed; while those on the upper branches are falcated, with their lobes even more arched than those shown in *fig.* 1750. This remarkable difference led the elder Michaux to describe the specimens which he found growing in very cold bad land as Q. tríloba; and on the young shoots of these specimens he frequently found leaves deeply denticulated or lobed, like those of Q. rùbra or Q. coccínea, as represented at *a* in *fig.* 1751. The stumps of trees that have been felled, also, frequently send up shoots bearing leaves deeply denticulated at right angles to the main rib. Amidst all these changes, however, the leaves of Q. falcàta preserve one striking characteristic; which is, that there is always "a thick down upon the under side of the leaves, and upon the young shoots to which they are attached." The acorns are small, round, brown, and contained in slightly scaly, shallow, top-shaped cups, supported on short peduncles: they resemble those of Q. Banísteri, and, like them, preserve the power of germination for a long time. The growth of this tree, according



1751

to the elder Michaux, is extremely rapid and vigorous, even on the worst soils. The most northern boundary of Q. falcàta is the neighbourhood of Allentown, in New Jersey, about 60 miles from Philadelphia. Even at this distance, says the younger Michaux, the leaves are smaller than in the immediate vicinity of the city, where they begin to assume their appropriate form. Farther south, Q. falcàta is constantly found among the most common trees in the forests; but it is less frequent near the mountains, and in the country beyond. "In Delaware, Maryland, and Virginia, it is known by the name of the Spanish oak; and, in the Carolinas and Georgia, by that of the red oak." Michaux adds that, in an old English work which he found in the library at Charleston, it is said to have been called the Spanish oak by the first settlers, from the resemblance of its leaves to those of Q. *Velàni*, which grows in Spain." If Q. Æ'gilops is the oak meant, the resemblance must have been very slight. The name of the red oak was probably derived from the great analogy between the wood of this species and that of Q. rùbra. The wood of the Spanish oak is, however, better than that of the latter, though it is, also, too porous to contain wine or spirits; and, from its want of durability, it is considered greatly inferior to that of the oaks belonging to the section A'lbæ. "The principal merit of the Spanish oak," says the younger Michaux, "consists in its bark. This is preferred for tanning coarse leather, which it renders whiter and more supple; it is consequently sold, at Phila-

1752



delphia and Wilmington, a fourth dearer than that of either the red or the scarlet oak : the leather is said to be improved by the addition of a small quantity of the bark of the hemlock spruce." (*N. Amer. Syl.*, i. p. 80.) This species of oak is used in New Jersey to form hedges. The elder Michaux says that, for this purpose, the acorns are sown on a raised bank; and that they must be carefully defended, during the first winter, from rats and moles, which are fond of them. The young plants must be kept clear of weeds, and earthed up during the two following years; and, in the course of the fourth, they will form a very thick and strong hedge; the young shoots and branches crossing and intertwining with each other. If kept properly pruned and weeded, and the gaps filled up by young plants raised in boxes, a hedge of this kind will last more than a century. (*Hist. des Chênes*, No. 14.) This species appears from the *Hortus Kewensis*, 2d ed., to have been introduced, under the name of Q. elongàta, by Mr. Murdock Murchison, in 1763; and to have been reintroduced, under the name of Q. tríloba, by the Messrs. Fraser, in 1800. There are plants at Messrs. Loddiges's, under the name of Q. lyràta, as well as that of Q. falcàta; and there is a tree at Trentham called Q. falcàta, which is 20 ft. high, diameter of the trunk 11 in., and of the head 18 ft. *Phalæ'na* (Dryocámpa *Harris*) stígma *Abb. and Smith*, t. 56. and our *fig.* 1752.; *Bómbyx* stígma *Fab. Ent.*, 4. p. 424.; the orange white-spot moth; feeds upon the leaves of this oak and Q. tinctòria. In a young state the whole brood of caterpillars keep together, but disperse as they grow larger. It is very seldom seen on the wing. One observed by Abbott went into the ground on the 20th of September, and came forth on the 16th of June. Both the larva and imago are of a bright orange colour.

♀ 18. Q. TINCTO'RIA *Willd.* The *Quercitron, or* Dyer's, Oak.

Identification. Willd. Sp. Pl., 4. p. 444.; Ait. Hort. Kew., 5. p. 291.; Pursh Fl. Amer. Sept., 2. p. 629.; N. Du Ham., 7. p. 170.; Smith in Rees's Cycl., No. 58.
Synonymes. Q. virginiàna, &c., *Pluk. Phyt.*, t. 54. f. 5.; Q. discolor *Willd. Arb.*, 274., *Smith* in *Abb. Ins.*, 2. p. 111.; the black Oak, *Amer.*; Chêne des Teinturiers, *Fr.*

Engravings. Michx. Quer., t. 24.; N. Amer. Syl., 1. t. 24.; our *figs.* 1753. and 1754.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves downy beneath, obovate-oblong, dilated, widely sinuated; lobes short, obtuse, slightly toothed, bristle-pointed. Calyx of the fruit flat underneath; nut globose. (*Willd.*) A tree, varying from 80 ft. to 100 ft. high. Introduced in 1800.

Varieties. Michaux, in his *Flora Borealis Americana*, gives the two following forms of this species: —

1753





1754

¶ Q. *t.* 1 *angulòsa* Michx.; *Q.* nìgra *Pursh Arb. Am.*, p. 120.; *Q.* americàna *Pluk. Alm.*, p. 309.; *Q.* velutìna *Lam. Dict.*; *Q.* tinctòria *Bart. Trav.*, p. 37.; and our *figs.* 1753, 1754. — Leaves smooth, lobed with angular lobes. Cup top-shaped. Nut globose, and depressed at the summit. A native of the shores of Lake Champlain, in Pennsylvania, and of high mountains in Carolina and Georgia.

¶ Q. *t.* 2 *sinuòsa* Michx.; *Q.* nìgra *Wang.*; and our *figs.* 1755, 1756, and 1757. — Leaves deeply sinuated. Cup flat and turbinated. Nut ovate. Native of South Carolina and Georgia.



1755

Description, &c. This oak, according to the younger Michaux, is the loftiest oak in America, being from 90 ft. to 100 ft. high, with a trunk from 4 ft. to 5 ft. in diameter. The trunk is straight, and is covered with a deeply furrowed bark of middling thickness, but always black, or of a very deep brown colour; whence, probably, the tree derives its common name in America; viz. the black oak. The dark hue of the bark easily distinguishes this tree from *Q.* rùbra, *Q.* coccínea, and *Q.* ambígua, in the northern provinces; but, in the southern ones, *Q.* falcàta having bark of the same colour, *Q.* tinctòria can only be distinguished by its buds, which are longer, more acuminate, and more scaly, than those of the former species. The inner bark of *Q.* tinctòria, if chewed, is very bitter, and gives a yellow tinge to the saliva, which is not the case with the bark of *Q.* falcàta. The wood is reddish, coarse-grained, and porous, like that of all the red oaks. The leaves are large, deeply laciniated, and resemble those of *Q.* coccínea, but they have fewer lobes, never exceeding four or five; while the leaves of the old trees of *Q.* coccínea have from five to seven: they are also less openly and roundly sinuated, less shining, of a duller green, and, during a part of the summer, have their surfaces roughened with small glands, which are visible to the eye and sensible to the touch; and which are also found on the young shoots. In autumn, the leaves of young trees turn to a dull red; but those on old trees become yellow, or of a yel-

lowish brown, beginning with the petiole. This oak is nearly as extensively distributed in North America as the white oak; and, except in the district of Maine, and the northern



1756



1757

part of New Hampshire, Vermont, and Tennessee, this species is found throughout the United States, on both sides of the Alleghanies; and it is everywhere called the black oak, except in some parts of New England, where, according to Dr. Brown (*Syl. Amer.*), it is called the yellow oak. It flourishes in Maryland, and in some parts of Virginia, where the soil is lean, gravelly, and uneven; and it generally will grow in a poorer soil than the white oak. This oak was one of those enumerated by the elder Michaux, as being advisable to introduce into France, and of which he sent seeds to that country in 1786 (see p. 142.); notwithstanding which, it does not appear that there are any large specimens in France; and the plants raised by Michaux were probably lost during the revolution of 1789, when a great part of the plantations of Rambouillet were destroyed. It was introduced into England in 1800, by the Messrs. Fraser, but has been but very little cultivated, though it is a tree of great regularity and beauty, and, even in this country, might possibly become of use for its bark.

Properties and Uses. The wood, though coarse-grained and porous, is much more esteemed for strength and durability than that of any other American oak of biennial fructification. In Philadelphia, it is employed in building; and, in most parts of the northern states, it is used as a substitute for the white oak, whenever that tree is scarce; and a large proportion of what are called the best red oak staves, which are used, in Canada and the West Indies, to form casks for flour, salted provisions, and molasses, are made of the wood of this tree. The bark is extensively used in tanning; for which it is well adapted, as it is produced in great abundance, and is rich in tannin. The only inconvenience is, that shoes made of leather tanned with it are apt to impart a yellow tinge to the stockings. This colour, however, may be discharged by subjecting the leather to a particular process, when it is thought worth while to incur the expense. The most useful product of this oak is the quercitron, which is much used in both America and England for dyeing; and which is not only equal to woad in the brilliancy of the yellow produced, but is so much stronger, that Dr. Bancroft states that one part of quercitron yields as much colouring matter as 8 or 10 parts of woad. The colouring matter is contained in the inner bark, a decoction of which forms a brownish yellow dye, which may be rendered deeper by alkalies, and lighter by acids. A solution of alum causes a small portion of the colouring matter to fall in a deep yellow precipitate; and solutions of tin afford a more abundant precipitate, of a brighter hue. To dye wool, it is sufficient to boil the quercitron with an equal

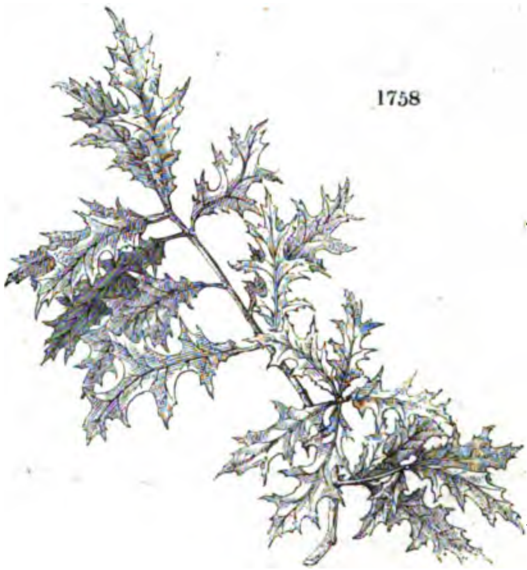
weight of alum: to dye silk, the proportion is 1 lb. of the quercitron to 12 lb. of silk. The quercitron is chiefly exported from Philadelphia. According to M'Culloch, the average quantity imported for three years, ending in 1831, was 25,015 cwt. a year; and the price of this varied, according to the quality, from 12*s*. 6*d*. to 15*s*. per cwt., including 1*s*. each for duty. Dr. Bancroft first discovered and applied the dyeing properties of the quercitron; and he obtained a patent for his invention in 1775; but, the American war breaking out soon after, he reaped little profit from his discovery, though it has been of great advantage to the arts and manufactures of both England and America. (*Com. Dict.*, art. Bark.)

Statistics. In England, in the environs of London, the largest plant we know of is at Messrs. Loddiges's, where there is a tree 20 ft. high, of which a portrait is given in our last Volume. In Staffordshire, at Trentham, 26 years planted, it is 24 ft. high, the diameter of the trunk 8 in., and of the head 10 ft.; in Worcestershire, at Croome, 40 years planted, it is 45 ft. high, the diameter of the trunk 20 in., and of the head 40 ft. In the Edinburgh Botanic Garden, 10 years planted, it is 10 ft. high. In France, in Brittany, at Barres, 8 years planted, it is 12 ft. high. In Austria, at Brück on the Leytha, 30 years old, it is 12 ft. high. In Italy, in Lombardy, at Monza, 6 years planted, it is 10 ft. high.

♀ 19. *Q.* PALU'STRIS *Willd.* The Marsh, *or Pin*, Oak.

Identification. Du Roi Harbk., 2., t. 5. f. 4.; Wang. Amer., t. 5. f. 10.; Michx. Quer., No. 19.; Arb., 2. p. 123. t. 25.; Willd. Sp. Pl., 4. p. 446.; Ait. Hort. Kew., 5. p. 192.; Pursh Fl. Amer. Sept., 2. p. 631.; N. Du Ham., 7. p. 172.; Smith in Rees's Cycl., No. 63.; Lodd. Cat., ed. 1836.
Synonymes. *Q.* montàna *Lodd. Cat.*, ed. 1836; *Q.* Banisteri Lodd. Cat., ed. 1836.
Engravings. Michx. Quer., t. 33, 34.; N. Amer. Syl., 1. t. 27.; our *figs.* 1758. and 1759.; and the plate of this tree in our last Volume.

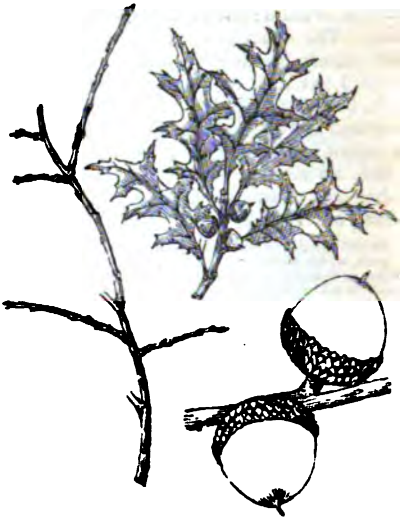
Spec. Char., &c. Leaves smooth, oblong, deeply and widely sinuated, on long stalks; lobes distant, parallel, acute, sharply toothed, bristle-pointed; forks of the veins densely woolly beneath. Calyx of the fruit flattened; nut nearly globose. (*Willd.*) A tree, 80 ft. high. Introduced in 1800.

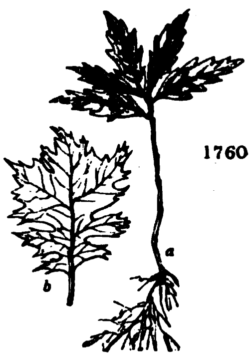


1758

Description, &c. The pin oak, according to the younger Michaux, is a tall tree, rising, in marshy ground, to the height of 80 ft., with a trunk 3 ft. or 4 ft. in diameter. "Its secondary branches are more slender and numerous than is common on so large a tree, and are intermingled, so as to give it, at a distance, the appearance of being full of pins. This singular disposition renders it distinguishable at first sight in winter, and, is perhaps, the cause of its being called the pin oak." (*N. Amer. Syl.*, i. p. 101.) The tree, when young, assumes an agreeable pyramidal shape; and its far-extending drooping branches, and light and elegant foliage, render it, in our opinion, the most graceful of all oaks. The bark on the oldest trees of *Q.* palústris is scarcely ever cracked: on young trees it is perfectly smooth. The wood is coarse-grained, and resembles that of the red oak. In the climate of London, the tree is remarkably hardy; and its rate of growth is much more rapid than that of every other American oak, with the single exception of *Q.* ambígua. This may

be rendered obvious at a glance, by inspecting the line of oaks at Messrs. Loddiges's, where there are three trees, marked Q. palústris, Q. Banísteri, and Q. montàna, (all of which are the Q. palústris of Michaux,) which are above 30 ft. high, which is several feet higher than all the others, with the single exception of Q. ambígua. A tree (*fig.* 1761.) of this species in the Horticultural Society's Garden, which had been overtopped with elms, in the manner already mentioned (p. 1864.), has lost its leader, and has more the appearance of a stunted bush than a tree. It is not one third of the size of those at Messrs. Loddiges's, of one of which the tree in our last Volume is a portrait. The leaves are much smaller than those of all the other species of this section: they are smooth, of a pleasing green, supported on very long petioles, and, on old trees, are very deeply laciniated. On young trees, they are much less so, as will be seen by *fig.* 1760. copied from Michaux's *Histoire des Chênes*, in which *a* is a seedling of one year old, and *b* a leaf from a tree two years old. The acorns are small, round, and contained in flat shallow cups, of which the scales are closely applied one upon another. The





1760



1761

wood, though stronger and more tenacious than that of either the red or the scarlet oaks, has the pores still larger and more open than those of either of these woods. It is used for the axles of mill-wheels, when white oak of sufficient dimensions cannot be procured; and sometimes, though rarely, it is made into staves for casks for dry goods. For small groups, and especially in moist rich soil, we cannot sufficiently recommend this tree. Its growth is rapid, and the disposition of its branches is singularly graceful from its infancy upwards. A few years ago, there were a great many trees of it in the Leyton Nursery, which were taken up and burnt for want of sale. The most beautiful small specimen we know is in th

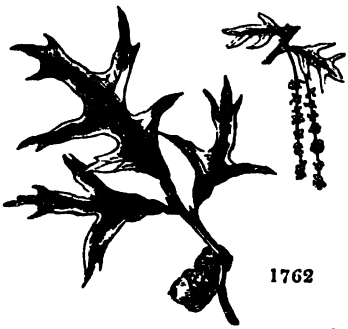
Goldworth Arboretum. The specimen trees at Messrs. Loddiges's, and one in the Milford Arboretum, were equally beautiful before they were severely cut in, to give more room to the surrounding plants.

♀ 20. *Q.* CATESBÆ'I Willd. The *barren Scrub* Oak.

Identification. Willd. Sp. Pl., 4. p. 446.; Pursh Fl. Amer. Sept., 2. p. 630.; Michx. Quer., No. 17.; N. Du Ham., 7. p. 172.; Smith in Rees's Cycl., No. 62.
Synonymes, Q. rùbra β *Abb. and Smith Ins.*, 1. p. 27.; *Q.* Æ'sculi divisùra, &c., *Cat. Car.*, 1. t. 23.
Engravings Michx. Quer., t. 29, 30.; Cat. Car., 1. t. 23.; and our *figs.* 1762, 1763.

Spec. Char., &c. Leaves smooth, oblong, wedge-shaped at the base, deeply and widely sinuated, on short stalks; lobes 3 or 5, divaricated, acute, 2- or 3-cleft, bristle-pointed. Calyx of the fruit turbinate, half as long as the nut. (*Willd.*) A shrub or low tree, from 15 ft. to 30 ft. high. Introduced in 1823.

Description, &c. The general appearance of this tree is stunted: its trunk is crooked, dividing into branches at 2 ft. or 3 ft. from the ground, and covered with a thick, blackish, deeply furrowed bark. The foliage is open, and its leaves are large, smooth, thick, and coriaceous towards the close of summer, deeply and irregularly laciniated, and supported on short petioles. "With the first frost, they change to a dull red, and fall the ensuing month. The acorns are pretty large, of a blackish colour, and partly covered with a fine grey dust, which is easily rubbed off between the fingers: they are contained in thick cups, swollen towards the edge, with the upper scales bent inwards. The oldest trees alone are productive, and their fruit never exceeds a few handfuls." (*N. Amer. Syl.*, i. p. 86.) According



1762

to the younger Michaux, this oak is confined to the lower part of the Carolinas and Georgia. It grows in soils too meagre to sustain any other vegetation, where the light movable sand is wholly destitute of vegetable mould. It is the only species multiplied in the pine barrens; and from this circumstance, and its scrubby habit of growth, it has probably obtained the name of the barren scrub oak. The elder Michaux says that it is sometimes found from 30 ft. to 40 ft. high. The leaves vary very little, as will be seen by *fig.* 1763., in which *a* represents a seedling of one year's growth, and *b* a leaf from a plant two years old. This oak, though not introduced till 1823, is supposed to be the one figured in Catesby's *Carolina*, which he calls the red oak with small pedunculated acorns, and describes as follows: — "Bark dark, thick, and strong, preferable for tanning. Wood coarse and spongy. The acorns vary much in shape; and the leaves retain no certain form, but sport into various shapes, more than those of other



1763

oaks." (*Catesb. Carol.*, i. p. 23.) He adds that the wild pigeons assemble in such numbers on this oak, that they sometimes break down the branches, and leave their dung some inches thick under the trees. The elder Michaux says that Catesby has confounded this tree with *Q.* rùbra; which is probably the case, as his description accords much better with that species, than this tree. The wood of *Q.* Catesbæ'i is considered excellent as fuel; and it bears a higher price than that of any other oak in America for that purpose.

We are not aware of there being any trees of this oak in the neighbourhood of London; but we believe there are plants of it in the Edinburgh Botanic Garden, raised from acorns brought over by Mr. M'Nab, jun., in 1834. (See p. 182.)

§ vi. *Nìgræ.* *Black American Oaks.*

Sect. Char., &c. Leaves wedge-shaped, or imperfectly lobed; mucronated, but the mucros generally dropping off when the leaves have attained their full size. Leaves dying off of a blackish green, and in America frequently persistent. Bark black, and not scaling off. Fructification biennial. Nut ovate, with a persistent style, and sometimes marked with dark lines. Trees, from 20 ft. to 40 ft. high; and one of them, a miniature tree, often not exceeding 3 ft. in height. Rate of growth less rapid than in the preceding sections.

⫯ 21. *Q.* NI'GRA *L.* The Black Jack Oak.

Identification. Cat. Carol., t. 19.; Lin. Sp. Pl., 1413.; Willd. Sp. Pl., 4. p. 442.; Ait. Hort. Kew., 5. p. 291.; Pursh Fl. Amer. Sept., 2. p. 629.; Sm. and Abb. Ins., 2. p. 115.; Michx. Quer., No. 12.; N. Du Ham., 7. p. 168.; Sm. in Rees's Cycl., No. 53.
Synonymes. *Q.* marylándica, &c., *Raii*; *Q.* ferruginea *Michx. N. Amer. Syl.*, 1. p. 79. t. 20.; *Q.* aquática *Lodd. Cat.*, ed. 1836; Barrens Oak, *Amer.*
Engravings. Abb. Ins., t. 58.; Michx. Quer., t. 22, 23.; Cat. Carol., t. 19.; and our *fig.* 1764.

Spec. Char., &c. Leaves wedge-shaped, somewhat heart-shaped at the base; dilated, abrupt, and very slightly 3-lobed at the end; the middle lobe shortest, smooth above, rusty beneath. Calyx hemispherical, with membranous scales. Nut roundish-ovate. (*Willd.*) A tree, 20 ft. or 30 ft. high. Introduced before 1739.

Description, &c. The Black Jack oak, according to the younger Michaux, is sometimes 30 ft. high, and 8 in. or 10 in. in diameter, but commonly does not exceed half these dimensions. Its trunk is generally crooked; and it is covered with a very hard, thick, and deeply furrowed bark, which is black on the outside, though the inner bark is of a dull red. The head of the tree is broad and spreading, even in the midst of the woods. The leaves are of a very remarkable shape, being dilated towards the summit, like a pear, and armed, when young, with 3 or 5 bristle-like points, which fall off when the leaf has attained its full size. *Fig.* 1765., from Michaux's *Histoire des Chênes*, shows these mucros on seedlings of one year's and two years' growth. The leaves are yellowish, and somewhat downy, at their first unfolding in spring; but, when fully expanded, they become of a dark green above, and rusty beneath: they are also



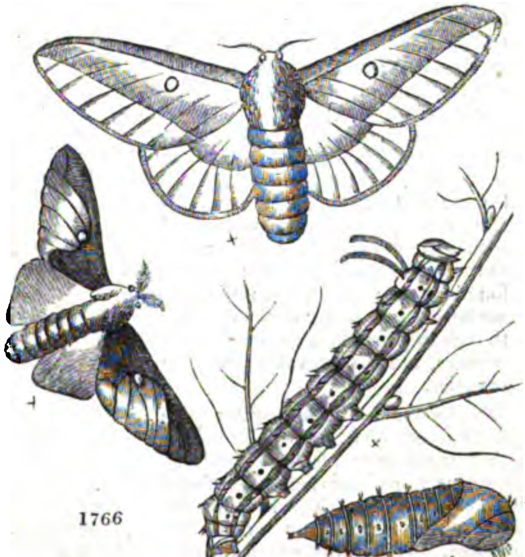
1764

thick and leathery in their texture. In autumn, they turn of a blackish red, and fall with the first frost. The oldest trees bear only a few handfuls of acorns, which are large, and half-covered with very scaly cups. Michaux observed this species for the first time in some forests in New Jersey, about 60 miles east of Philadelphia. It is commonly found upon soils composed of red argillaceous sand, mingled with gravel, and so meagre as scarcely to bear cropping. The greater part of Maryland and Virginia, from Baltimore to the borders of North Carolina (a distance of 400 or 500 miles), is, according to the younger Michaux, composed of this kind of soil; and here the Black Jack oak is found in the greatest abundance. The whole of this interval, with the exception of the valleys and the swamps, with their surrounding acclivities, is covered with forests impoverished by fire, and by the cattle



1765

which subsist in them during the greater part of the year. They are composed principally of the Pìnus palústris, Quércus obtusíloba, Q. nìgra, Q. tinctòria, and Q. coccínea. In the Carolinas and Georgia, where the soil gradually improves in retiring from the shore towards the mountains, the Black Jack oak forms a band 15 or 20 miles broad, between the pine barrens and the forests of nobler trees. In Kentucky and Tennessee, the Black Jack oak is only seen in the savannahs, where it is widely diffused; and where, preserved by the thickness of its bark, and its insulated position, it survives the conflagrations that almost every year consume the grass; the fire, driven forward by the wind, having only time to devour its foliage. In the pine barrens, this oak grows chiefly on the edges of the branch swamps, where the soil is little stronger than is necessary for the pines. With Q. cinèrea and Q. Catesbæ'i, it possesses itself of the pine lands that have been cleared for cultivation, and afterwards abandoned on account of their sterility; and in these situations it becomes larger than in the forests. (*N. Amer. Syl.*, i. p. 80.) In New Jersey and Philadelphia, this species is called the barrens oak; and in Maryland and the more southern states, the Black Jack oak. The specific name of nìgra was given to it by Linnæus, from the blackness of its bark and general appearance; but Michaux preferred the name of ferrugínea, not only because the under surface of the leaves is of a rusty brown, but because Q. tinctòria, in America, is generally known by the name of the black oak. The wood is heavy and compact; but it decays so rapidly, when exposed to the weather, that it is not used in the arts: it makes excellent fuel, and is sold in Philadelphia for only a little less than hickory, and for one third more than every other kind of wood. Notwithstanding the leathery texture of the leaves of this tree, they are attacked by the larva of *Phalæ'na* lùcida *Sm. and Abb. Ins.*, t. 58., syn. Dryocámpa lùcida *Harris*, *P.* virginiénsis *Dru. Ins.*, 2. t. 13. f. 2., and our *fig.* 1766., the transparent-winged white-spot moth. The caterpillar of this moth is pink, streaked with a yellowish green; and the perfect insect pink, brown, and yellow. The caterpillar buries itself in the ground, but remains there only a short time; one observed by Abbott buried itself on the 12th of July, and the moth appeared on the 26th. The larva of *P.* quernària *Sm. and Abb. Ins.*, t. 93., the American oak beauty, also feeds on the leaves of this species. There are



1766

plants of the Black Jack in the Horticultural Society's Garden, and a tree in the arboretum of the Messrs. Loddiges, under the name of *Q.* aquática.

♆ 22. *Q.* AQUA'TICA *Soland.* The Water Oak.

Identification. Soland. in Ait. Hort. Kew., ed. 1., 3. p. 357., ed. 2., No. 11.; Willd. Sp. Pl., 4. p. 441.; Pursh Fl. Amer. Sept., 2. p. 628.; Michx. Quer., No. 11.; N. Du Ham., 7. p. 167.; Smith in Rees's Cycl., No. 52.

Synonymes. *Q.* fòliis cuneifórmibus, &c., *Gron. Virg.*; *Q.* fòlio non serràto, &c., *Cat. Carol.*, 1. t. 20.; *Q.* nìgra *Willd. Sp. Pl.*, 1413.; *Q.* uliginòsa *Wangh. Amer.*, t. 6. f. 18.

Engravings. Michx. Quer., t. 19, 20, and 21.; Cat. Carol., t. 20.; and our *fig.* 1767.

Spec. Char., &c. Leaves wedge-shaped, smooth; tapering at the base; dilated and obscurely 3-lobed at the end; the middle lobe largest. Calyx nearly hemispherical. Nut roundish. (*Willd.*) A tree, from 40 ft. to 60 ft. high. Introduced before 1723.

Varieties.

♆ *Q. a.* 2 *nàna*; *Q.* aquática *Smith and Abb. Ins.*, ii. p. 117. t. 59.; *Q. a.* elongàta *Ait. Hort. Kew.*, v. p. 290.; *Q.* dentàta *Bart. Trav.*, p. 14. and 28.; *Q.* nàna *Willd. Sp. Pl.*, iv. p. 443., *Pursh Fl. Amer. Sept.*, ii. p. 628., *N. Du. Ham.*, vii. p. 169., *Smith* in *Rees's Cycl.*, No. 55.; the Dwarf jagged Oak; is of much lower stature than the species, and has the leaves nearly sessile, and more distinctly lobed.

♆ *Q. a.* 3 *marítima* Michx. Quer., No. 11. t. 20. f. 2.; *Q.* hemisphæ'rica *Willd. Sp. Pl.*, iv. p. 443., *Bart. Trav.*, p. 320., *Pursh Fl. Amer. Sept.*, ii. p. 628., *N. Du Ham.*, vii. p. 169., *Smith* in *Rees's Cycl.*, No. 65.; has persistent leaves.


1767

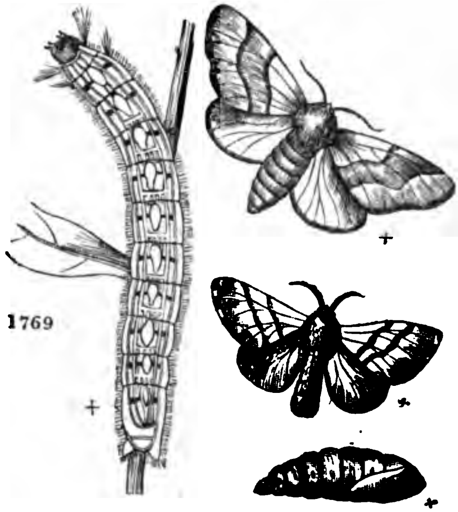
Other Varieties. There is no American oak, not even *Q.* falcàta, of which the foliage is so variable as of this tree. On full-grown trees, the leaves are smooth, shining, and heart-shaped; or broad and rounded at the summit, and terminating in a point at the base, as in *fig.* 1767.; and on young trees, or on shoots from the root of old trees, the leaves are oval, toothed, oblong, and, in short, of all the different forms shown in *fig.* 1768., taken from the *Histoire des Chênes*. In the *Hortus Kewensis*, five varieties are enumerated, only differing in the shape of the leaves; but the elder Michaux asserts that they cannot be propagated with certainty even by grafting; and that all the different kinds may be found on one tree. Even the two we have given under distinct names, though they are made species by some authors, are rather variations than varieties.


1768

Description, &c. The water oak rarely exceeds 40 ft. or 45 ft. in height, with a trunk from 1 ft. to 1 ft. 6 in. in diameter; though it is sometimes found 50 ft. or 60 ft. high. The bark, on the oldest trees, is smooth, or very slightly furrowed. The acorns, which are of a dark brown, and are small and extremely bitter, are contained in shallow slightly scaly cups. They are not

abundant, as the largest tree seldom yields more than a few pints. This oak varies very much from soil and climate. In Virginia, which is its most northern habitat, the tree is only 40 ft. or 45 ft. high; and its leaves, which vary exceedingly, but are generally wedge-shaped, drop at the first frost. In the inland parts of the southern states, the tree attains its largest size; but on the sea coast it becomes dwarfish, and the leaves persistent; they frequently remaining on the tree for two or three years. In the Carolinas, Georgia, and East Florida, it is most abundant; and it is always found in the stagnant pools and narrow swamps enclosed in the pine barrens. It is one of the American oaks mentioned by Catesby, and was cultivated in Fairchild's Nursery before the year 1723. As a useful tree, it has no recommendations: the wood is tough; but it decays so soon, that it is never used in America, where it is not esteemed even for fuel. The bark contains some tannin; but it is considered so inferior to that of other oaks, that it is never used by the tanners; and the acorns are so bitter, that even pigs will not eat them. When young, the tree is frequently attacked by the larva of a moth, considered by Abbott and Smith as identical with the English *Phalæ'na* (*Clisiocámpa*) *neùstria L. Syst. Nat.*, 818., *Smith and Abb. Ins.*, t. 59.; and our *fig.* 1769. This insect is extremely abundant both in Europe and America; and in the latter country it is often found in such quantities in the larva state as entirely to strip the oak on which it feeds of leaves. There are trees of *Q. aquática* in the Horticultural Society's Garden; and numerous young plants for sale in the nursery ground occupied by Mr. Charlwood of Covent Garden Market.

1769



■ 23. *Q.* ILICIFO'LIA *Wang.* The Holly-leaved, *or Bear*, Oak.

Identification. Wang. Amer., 79. t. 6. f. 17.; Willd. Sp. Pl., 4. p. 447.; Ait. Hort. Kew., ed. 2., 5. p. 292.; Smith in Rees's Cycl., No. 66.
Synonymes. *Q. Banísteri* Michx. Quer., No. 15., N. Du Ham., 7. p. 173., Pursh Fl. Amer. Sept., 2. p. 631.; ? *Q.* aquática *Abbott and Smith Ins.*, 2. p. 157.; Black Scrub Oak, Dwarf red Oak, *Amer.*
Engravings. Wang. Amer., t. 6. f. 17.; ? Abb. Ins., 2. t. 79.; N. Amer. Syl., 1. p. 21.; and our *fig.* 1770.

Spec. Char., &c. Leaves obovate-wedge-shaped, with 3 or 5 deep bristle-pointed lobes, entire; downy beneath. Fruit stalked, in pairs. (*Willd.*) A shrub, or low tree, from 3 ft. to 10 ft. high. Introduced in 1800.

Description, &c. This very remarkable little tree is generally found about 3 ft. or 4 ft. high; but, in favourable situations, it is sometimes found to reach the height of 8 ft. or 10 ft. "It usually grows in compact masses, which are traversed with difficulty, though no higher than the waist. As the individuals which compose them are of a uniform height, they form so even a surface, that, at a distance, the ground appears to be covered with grass, instead of shrubs." (*N. Amer. Syl.*, i. p. 83.) The trunk, which is much confined, is covered, like the branches, with a polished bark. It has more strength than would be supposed from its size, which is rarely more than 1 in. in diameter. The leaves are of a dark green on the upper surface, whitish beneath, and regularly divided into 3 or 5 lobes. The acorns are small, blackish, and lon-


1770

gitudinally marked with a few reddish lines; and they are so abundant as sometimes to cover the branches. The bear oak is common in the northern states, also in New Jersey, New York, and Pennsylvania. It is never found insulated, or mingled with other trees and shrubs in the forest; but always in tracts of several hundred acres in extent, which it covers almost exclusively, a few specimens of the chinquapin oak (*Q. Prìnus pùmila*) only breaking its uniformity. The presence of this oak is considered a sure indication of a barren soil; and it is usually found on dry sandy land mingled with gravel. This oak was first observed by Banister, after whom it was named by some authors; it was not, however, till 1800, that it was brought to this country by the Messrs. Fraser, to whom we owe the introduction of many species of American oaks. The tree is too small for the wood to be of any use; but the acorns afford an abundant supply of food to deer, bears, and swine, which, from the low stature of the plant, can "reach them by lifting their heads, or rising on their hind feet." The younger Michaux saw it used for hedges; and he suggests that it might be planted as copse-wood, as it would afford food, as well as an excellent shelter, for game; also, that, as it will grow in the most sterile soil, and resist the most impetuous winds, it might serve as a nurse to plantations in exposed situations, such as the dykes in Holland. The larva of *Phalæ'na (Orgyìa) leucostígma Sm. and Abb. Ins.*, t. 79., the pale vapourer moth, feeds on the leaves of this species.

Ɨ 24. *Q.* HETEROPHY'LLA *Michx.* The various-leaved, *or Bartram's*, Oak.

Identification. Michx. Amer. Syl., 1. p. 75.; Pursh Fl. Amer. Sept., 2. p. 627.
Engraving. Michx. Amer. Syl., t. 18.

Spec. Char. Leaves on long footstalks, ovate-lanceolate or oblong, entire or unequally toothed. Cup hemispherical. Nut roundish. (*Michx.*) A tree, 30 ft. high.

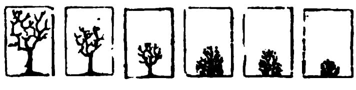
Description, &c. It is a remarkable fact, that, notwithstanding the apparent distinctness of this oak, only one specimen of it has been found in a wild state, and that was discovered by Michaux, in a field belonging to Mr. Bartram, on the banks of the Schuylkill, 4 miles from Philadelphia. This was a flourishing tree, 30 ft. high, with a trunk 12 in. in diameter. The leaves are of an elongated oval form, coarsely and irregularly toothed, smooth above, and of a dark green beneath. The acorns are round, of a middle size, and contained in shallow cups, lightly covered with scales. It is said to have been introduced, but we do not know where it is to be obtained.

■ 25. *Q.* AGRIFO'LIA *Willd.* The prickly-leaved *American* Oak.

Identification. Willd. Sp. Pl., 4. p. 434.; Nees in Ann. des Scien. Nat., 3. p. 271.; Fisch. Misc. Hisp., 1. p. 108.; Pursh Fl. Amer. Sept., 2. p. 627.; N. Du Ham., 7. p. 156.; Smith in Rees's Cycl., No. 29.
Engraving. ? Pluk. Phyt., t. 196. f. 3.

Spec. Char., &c. Leaves roundish-ovate, somewhat heart-shaped; smooth on both sides, with spinous teeth. Fruit axillary, sessile. Scales of the calyx lax. Nut ovate. (*Willd.*) A native of the western coast of North America, near Nootka Sound. It has not been introduced.

§ vii. *Phéllos. Willow Oaks.*



Sect. Char., &c. Leaves quite entire and lanceolate, dying off without much change of colour, in England; but, in America, sometimes persistent for two or three years. Young shoots straight, spreading, and wand-like. Bark very smooth, black, and never cracked. Fructification biennial. Cup imbricate. Nut roundish, and very small. Large trees and shrubs, the least beautiful in their foliage of the oak family.

Ɨ 26. *Q. Phe'llos L.* The *Willow* Oak.

Identification. Lin. Sp. Pl., 1412.; Willd. Sp. Pl., 4. p. 423.; Ait. Hort. Kew., ed. 2., 5. p. 287.; Pursh

Fl. Amer. Sept., 2. p. 625. ; N. Du Ham., 7. p. 150. ; Smith and Abb. Ins., 2. p. 181. ; Michx. Quer., No. 7. ; Smith in Rees's Cycl., No. 1.
Synonymes. Q. virginiàna, &c., *Pluk. Alm.*, p. 180. ; Q. I'lex marylándica *Raii Hist. Pl.*
Engravings. Catesb. Carol., 1. t. 16. ; Abb. Ins., 2. t. 91. ; Michx. Quer., t. 12. ; Pluk. Alm., t. 441. f. 7. ; our *fig.* 1774. ; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves membranaceous, linear, lanceolate; tapering at each end, entire, smooth, with a small point. Nut roundish. (*Smith* and *Willd.*) A tree, 60 ft. or 70 ft. high, in some soils and situations; and in others a shrub of diminutive growth.

Varieties.

♀ Q. P. 1 *sylváticus* Michx. Hist. des Chênes, No. vii. t. 12.; Wang. Amer., t. 5. f. 11.; and our *fig.* 1774.; has the leaves long and narrow on old trees, and trilobed on seedlings, as in *fig.* 1771.; and persistent, or deciduous, according to soil and situation. A tree, growing to the height of about 60 ft. Introduced in 1723. There is a tree in the Hackney arboretum 22 ft. high.



1771

♀ Q. P. 2 *latifòlius* Lodd. Cat., ed. 1836; and the plate of this tree in our last Volume.—A tree, with the leaves rather broader than those of the preceding form. There is a plant at Messrs. Loddiges's 15 ft. high.

Q. P. 3 *hùmilis* Pursh Fl. Amer. Sept., ii. p. 625., Catesb., i. t. 22., Wangh. Amer., t. 5. f. 12., has shorter leaves, which are deciduous. A shrub of low straggling growth.

Q. P. 4 *sericeus* ; Q. Phéllos *Smith and Abb. Ins.*, ii. t. 51. ; Q. P. pùmilus *Michx. Hist. des Chênes*, t. 13. f. 1. and 2. ; Q. humilior salicis foliis brevior ; the Highland Willow Oak ; Q. sericea *Willd. Sp. Pl.*, iv. p. 424., *Pursh Fl. Amer. Sept.*, ii. p. 626. ; *N. Du Ham.*, vii. p. 150., *Smith* in *Rees's Cycl.*, No. 3. ; Q. pùmila *Michx. N. Amer. Syl.*, i. t. 17. ; and our *fig.* 1772. The running Oak. — This curious little oak is the smallest of the genus, being only 20 in., or at most 2 ft., in height. The leaves are entire, smooth, or of an elongated oval shape, and about 2 in. long : they are of a reddish tint in spring, turning green as the season advances, and are deciduous. The acorns are small, and round ; and they are few in number, because the stem of the plant is burnt down to the ground almost every spring, by the fires kindled in the forests to consume the dead grass ; and, as this oak belongs to those whose fructification is biennial, the acorns are destroyed before they reach maturity. This plant is confined to the maritime parts of the Carolinas, Georgia, and the Floridas ; and it springs in the pine barrens, amid the numerous varieties of whortleberry and other plants which overspread the ground, wherever there is a little moisture in the soil, and the layer of vegetable mould is a few inches thick.

♀ Q. P. 5 *cinèreus* ; Q. P. γ *Lin. Sp. Pl.*, 1412. ; Q. P. β cinèreus *Ait. Hort. Kew.*, ed. 1., iii. p. 354. ; Q. hùmilis *Walt. Carol.*, 234. ; Q. cinèrea *Willd. Sp. Pl.*, iv. p. 425., *Ait. Hort. Kew.*, ed. 2., v. p. 288., *Pursh Fl. Amer. Sept.*, ii. p. 626., *N. Du Ham.*, vii. p. 151., *Smith*

1772





1773

in *Rees's Cycl.*, No. 6., *Michx. N. Amer. Syl.*, i. t. 16. ; and our *fig.* 1773. The Upland Willow Oak.—This kind varies so much, both in height and general appearance, that individual plants have frequently been taken for distinct species. It is only found in the maritime parts of the southern states, where it is little multiplied in comparison with many other species ; and is dispersed in small groups in the forests of white pine

(*Pinus Stròbus*). It is found also upon the sea shore, and in the pine barrens. In the latter situation, it is frequently from 18 ft. to 20 ft. high, with a trunk 4 in. or 5 in. in diameter; with entire leaves, 2 in. or 3 in. long, silky, and whitish beneath. In dry or sandy places, it is only 3 ft. or 4 ft. high, with denticulated leaves only 1 in. in length, which persist for 2 years. These changes are, however, not permanent, as F. A. Michaux found both kinds of leaves on the same tree. The upland willow oak is also often found in pine forests that have been cleared for cultivation, and afterwards abandoned on account of their sterility. In these places, as in the pine barrens, it is about 20 ft. high; and its trunk, crooked, and covered with a thick bark, begins to ramify at about a third of the height of the tree from the ground. In spring, it is distinguished by the reddish colour of its leaves and male catkins. The acorns, which are contained in shallow cups, are round and blackish, with the base of a bright rose colour, when freshly exposed. It is rare to meet with a tree that yields a quart of fruit. (*Michx.*) The bark of this tree, like that of *Q.* tinctòria, dyes yellow; but the tree is so rare in America, that no use is made either of its bark or wood.

Q. P. 6 *maritimus* Michx. Quer., No. 7.; *Q.* maritima *Willd. Sp. Pl.*, iv. p. 424., *Pursh Fl. Amer. Sept.*, ii. p. 625., *N. Du Ham.*, vii. p. 150., *Smith* in *Rees's Cycl.*, No. 2. — A low shrubby plant, from 3 ft. to 8 ft. high, according to Pursh; a native of the sea coast of Virginia and Carolina. The leaves are shorter than those of the species, and are persistent. It is sometimes called the evergreen willow oak.

Description, &c. *Q. Ph*éllos, in America, is seldom found above 50 ft. or 60 ft. high, with a trunk 2 ft. in diameter; but in England, according to our *Statistics*, it attains the height of 70 ft. and upwards. The trunk, even at an advanced age, is covered with a smooth bark. The leaves are 2 in. or 3 in. long, of a light green, smooth, narrow, entire, and very similar to those of the willow; whence the name of the willow oak, by which this species is known throughout the greater part of America. The shoots are straight, long, slender, wand-like, and not crossing one another so much as in most of the other kinds of oaks; so that the tree is almost as much like the willow, in its shoots as its leaves. The acorns, which are rarely abundant, are small, round, bitter, and of a dark brown colour: they are contained in shallow cups, slightly coated with scales; and, if kept in a cool place, they will preserve the power of germination for several months. The most northern boundary of the willow oak is Philadelphia; but it is more common, and of a larger size, in Virginia, the Carolinas, and Georgia, where the mildness of the climate is evidently favourable to its growth. "It is seen, however, only in the maritime parts of these states, and is a stranger to the inland districts, where the surface is mountainous, and the climate more severe." (*Michx.*) The willow oak generally grows in cool moist places; and, with *N*ýssa aquática, Magnòl*ia* glaúca, *A*'cer rùbrum, *L*aúrus carolinénsis, and *Q*uércus aquática, it borders the swamps in the lower part of the southern states. But, though the willow oak generally grows in moist places, it is sometimes found, along with the live oak, "near the sea, in the driest and most sandy soils. At a distance, it resembles the live oak in its shape and in its foliage, which, in those situations, persists during several years; but, on a closer examination, it is easily distinguished by the form of its leaves, which are shorter and narrower, and by the porous texture of its wood." (*Id.*) Catesby calls this oak *Q. I*'lex marylándica, after Ray; and mentions that, in 1723, it was growing in the garden of Mr. Fairchild. He adds that this tree is the favourite resort of the large white-billed woodpecker, which feeds upon the insects found in its bark, and injures the tree so much in dislodging them, that the ground under the tree is often covered with small chips. From this circumstance, the Spaniards call the birds *carpenteros*. (*Catesb. Carol.*, i. p. 16.) Michaux adds that the wood is reddish and coarse-grained, and so porous, that its staves are classed with those of the red oak. From the comparative rareness of the tree, however, they are seldom in the market. In some of the lower parts of Virginia, the wood of *Q. Ph*éllos is found to possess great strength



1774

and tenacity, and to split less easily than that of the white oak; hence, after having been thoroughly seasoned, it is employed for the felloes of wheels. In Georgia, fences are sometimes made of this oak; but they do not last longer than eight or ten years. As fuel, the wood of this tree sells at the lowest price. Several of the varieties mentioned have been introduced into Britain; but we have never seen any of them except one, which has the leaves rather broader than those of the species, but which is hardly worth keeping distinct. It is highly probable that, in our soil and climate, all those differences in the magnitude of the plant, and in the character of the foliage, produced by the geographical and geological circumstances by which the tree is accompanied in America, disappear, or, rather, are never produced. The tree, in England, is one of the hardiest and most rapid-growing of American oaks; and it may be also characterised as the least beautiful, its foliage being light in colour, thinly spread over the tree, and dying off, in autumn, with very little change.

Statistics. In the environs of London, at Syon, it is 64 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 47 ft. (see the portrait of this tree in our last Volume); in the Mile-End Nursery it is 34 ft. high; at Whitton Place it is 70 ft. high, the diameter of the trunk 2 ft. 6 in.; at Kenwood, Hampstead, 60 years planted, it is 40 ft. high, the diameter of the trunk 2 ft. 4 in., and of the head 44 ft. In Devonshire, in the Exeter Nursery, 53 years planted, it is 26 ft. high, with a trunk 1 ft. 6 in. in diameter; in Surrey, at Pepper Harrow, it is 70 ft. high; in Wiltshire, at Longleat, 65 years planted, it is 38 ft. high, the diameter of the trunk 1 ft. 7 in., and of the head 14 ft; in Worcestershire, at Croome, 40 years planted, it is 35 ft. high, the diameter of the trunk 10 in., and of the head 15 ft. In France, at Toulon, in the Botanic Garden, 36 years planted, it is 20 ft. high, the diameter of the trunk 2 ft. 7 in. In Austria, near Vienna, at Brück on the Leytha, 20 years old, it is 7 ft. high. In Lombardy, at Monza, 24 years planted, it is 44 ft. high, the diameter of the trunk 9 in., and of the head 20 ft.

Commercial Statistics. Plants, in the London nurseries, are 2*s*. 6*d*. each, and acorns 5*s*. per bushel. Seedling plants of one year are 10*s*. per hundred; one year transplanted, 25*s*. per hundred. At Bollwyller plants are 3 francs each; and at New York plants are 37½ cents each.

♀ 27. *Q.* (*P.*) LAURIFO'LIA *Willd.* The Laurel-leaved Oak.

Identification. Willd. Sp. Pl., 4. p. 427.; Ait., Pursh Fl. Amer. Sept., 2. p. 627.; Michx. Quer., No. 10.; N. Du Ham., 7. p. 153.; Smith in Rees's Cycl., No. 14.
Synonymes. The Laurel Oak, Swamp Willow Oak.
Engravings. Michx. Quer., t. 17.; and our *fig.* 1776.

Spec. Char., &c. Leaves obovate, entire, smooth, nearly sessile; tapering at the base. Nut roundish, even. (*Smith.*) A tree, 50 ft. or 60 ft. high; a native of South Carolina and Georgia. Introduced in 1786.

Variety.

♀ Q. (P.) l. 2 *hýbrida* Michx. Quer., No. 10. t. 18., and our *fig.* 1775.; *Q. l.* 2 obtùsa *Ait. Hort. Kew.*, ed. 2., v. p. 288., *Pursh Fl. Amer. Sept.*, ii. p. 627.; has rather more obtuse leaves than the species. This variety is supposed, by the elder Michaux, to be a hybrid between *Q.* aquática and *Q. laurifòlia*; because the shape of its leaves resembles the former species, while the general character and habit of growth of the tree resemble those of *Q. laurifòlia*. It grows on the banks of the rivers in the pine barrens, where the soil, at a little distance from the water, is only a dry sand.



1775



1776

Description, &c. This oak, which rises to the height of 50 ft., or 60 ft., is said by the elder Michaux to be very nearly allied to *Q. Phéllos*. He adds that its timber is very valuable, resembling that of the live oak, which is considered preferable

to that of any other American oak for ship-building. According to the second edition of the *Hortus Kewensis*, it was introduced by Mr. John Fraser, in 1786. It is not mentioned by the younger Michaux, probably, as Pursh conjectures, because he considered it only a variety of Q. imbricària, from which it differs principally in the value of its wood. As, however, the American oaks are found to vary very much, according to the soil and climate in which they grow, these two kinds may possibly be the same; Q. laurifòlia being only found in South Carolina and Georgia, and Q. imbricària on the Alleghany Mountains. The whole of the American oaks belonging to the section *Phéllos* are remarkable for retaining their leaves, in particular soils and situations, for two, three, and in some cases even four, years, without their changing colour; differing in this respect, both from evergreens, which change their leaves in the spring of every year; and from those deciduous trees which retain their leaves in a withered state during winter. There is a tree of the species in the Hammersmith Nursery, which is upwards of 20 ft. high; and, from its habit of growth and wand-like shoots, independently of any similarity in the leaves, we are strongly inclined to believe it only a variety of Q. *Phéllos*.

♆ 28. Q. IMBRICA'RIA *Willd.* The Shingle Oak.

Identification. Willd. Sp. Pl., 4. p. 428.; Ait. Hort. Kew., 5. p. 288.; Pursh Fl. Amer., Sept., 2. p. 627.; Michx. Quer., No. 10.; N. Du Ham.; 7. p. 154.; Smith in Rees's Cycl., No. 15.
Synonymes. Q. latifòlia *Hort.*; Laurel Oak, Filed-Cup Oak, Jack Oak, Black Jack Oak, *Amer.*; Chêne à Lattes, *Fr.*
Engravings. Michx. Quer., t. 15, 16.; N. Amer. Syl., 1. t. 15.; and our *fig.* 1777.

Spec. Char., &c. Leaves elliptic-oblong, acute at each end, entire, almost sessile; downy beneath. Nut nearly globose. (*Smith* and *Willd.*) A tree, a native of the Alleghanies, 40 ft. or 50 ft. high. Introduced in 1786.

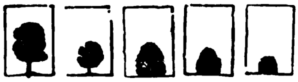
Description, &c. The shingle oak is from 40 ft. to 50 ft. high, with a trunk from 1 ft. to 1 ft. 3 in. in diameter. Its trunk, even when old, is covered with "a smooth bark; and, for three fourths of its height, it is laden with branches. It has an uncouth form when bare in winter, but is beautiful in summer, when clad in its thick tufted foliage. The leaves are long, lanceolate, entire, and of a shining green." (*N. Amer. Syl.*, i. p. 70.) Michaux adds that the trunk is branching, and often crooked; and the wood, though hard and heavy, has open pores, like that of Q. rùbra. East of the Alleghanies, this species is rare; but west of the mountains it is more multiplied, and better known. Its most northern boundary is the neighbourhood of Philadelphia; but it is found in the greatest abundance in Kentucky and Tennessee; also in the country of the Illinois, where it is called by the French *chêne à lattes*, or the lath oak. "In the western parts of Pennsylvania and Virginia, small lawns, covered only with tall grass, are frequently seen in the forests, around which this oak forms entire groves: insulated trees are also found in cool humid situations. It is, probably, from its flourishing in open exposures, that it is most abundant in the country of the Illinois, which consists of immeasurable savannahs, stretching in every direction, to which the forests bear no sensible proportion." (*Michx.*) This tree was brought to England in 1786, by Mr. John Fraser, but is rare in collections. According to the younger Michaux, it has no merit but in its foliage, the wood being even inferior to that of the willow oak, which it greatly resembles; and so crooked, as to be fit only for fuel. The elder Michaux, however, says, that, in the country of the Illinois, it is used for shingles. There is a tree of this species in the Horticultural Society's Garden.



1777

B. *Leaves evergreen.*

§ viii. I'lex. *Holm, or Holly, Oaks.*



a. *Natives of Europe.*

Sect. Char. Leaves ovate or oval, sometimes lanceolate, entire or serrated; with or without prickly mucros; downy beneath. Bark smooth and black, or rough and corky. Fructification biennial. Cups imbricate. Nut ovate, acuminate; sometimes very long in proportion to the cup. Low trees, or shrubs, of great commercial interest, from including the oaks which produce cork, the kermes insect, and edible acorns.

⚲ 29. Q. I'LEX *L.* The *common evergreen, or* Holm, Oak.

Identification. Lin. Sp. Pl., 1412.; Willd. Sp. Pl., 4. p. 433.; Ait. Hort. Kew., 5. p. 289.; N. Du Ham., 7. p. 156.; Smith in Rees's Cycl., No. 32.
Synonymes. I'lex arbòrea *Bauh. Hist.*, 1. p. 95.; l'Yeuse, or Chène vert., *Fr.*; Stein Eiche, *Ger.*; Elice, *Ital.*; Encina, *Span.*
Engravings. Blackw. Herb., t. 186.; N. Du Ham., t. 43, 44.; Dend. Brit., t. 90.; our *fig.* 1781.; and the plates of the tree in our last Volume.

Spec. Char., &c. Leaves ovate-oblong, acute, coriaceous, entire or serrated; hoary beneath. Bark even. Nut ovate. (*Willd.* and *Smith.*) A large shrub, or low or middle-sized tree, according to soil and situation; a native of the south of Europe, the north of Africa, and of Cochin-China, and other parts of Asia; in cultivation in British gardens from a very remote period; flowering in May, and ripening its acorns the second year.

Varieties. These are very numerous, and frequently very distinct; and, as in the case of every species of oak, they might be greatly increased by selecting from beds of seedling plants.



1778

⚲ Q. I. 1 *integrifòlia* Lodd. Cat., ed. 1836; Smilax *Dalech.*, *Bauh. Hist.*, i. p. 101.; Sùber secúndus *Matth. Valgr.*, i. p. 188., as to the figure; has the leaves lanceolate, entire.

⚲ Q. I. 2 *serratifòlia* Lodd. Cat., ed. 1836; I'lex *Matth. Valgr.*, i. p. 186., *Du Ham. Arb.*, i. t. 123., and our *fig.* 1778.; has the leaves lanceolate, serrated.

⚲ ▲ Q. I. 3 *fagifòlia* Lodd. Cat., ed. 1836; Phéllodrys *Matth. Valgr.*, i. p. 189., as to the figure; I'lex, No. 3., *Du Ham.*, *Arb.*, i. t. 224., and our *fig.* 1779.; has broader and less rigid leaves, which are more or less undulated, and sometimes slightly serrated.



1779

⚲ ▲ Q. I. 4 *críspa* Lodd. Cat., ed. 1836, has the leaves wrinkled at the edges.

⚲ ▲ Q. I. 5 *latifòlia* Lodd. Cat., ed. 1836; *Q. I.* oblónga *Hort.*; and our *fig.* 1780.; has broad leaves, nearly entire. There is a magnificent specimen of this variety at Purser's Cross, some of the leaves of which, on the lower part of the tree, are upwards of 5 in. long, and nearly 3 in. broad. The leaves of *Q. I.* fagifòlia often attain nearly the same size; but they differ in being undulated, and sometimes slightly serrated at the edges.



1780

♀ ▲ Q. I. 6 *longifòlia* Lodd. Cat., ed. 1836; *Q. I. salicifòlia Hort.*; has long and very narrow leaves. There is a fine tree at Sawbridgeworth, from which plants have been propagated in the nursery of Messrs. Rivers.

♀ ▲ Q. I. 7 *variegàta* Hort. has the leaves variegated with white. This variety was brought into notice in 1836, by Mr Veitch of the Killerton Nursery.

Other Varieties. Q. I. *lusitánica* Lodd. Cat., ed. 1836, we have not seen, the plant being dead. *Q.* lusitánica *Lam.* is thought by Captain S. E. Cook to be identical with the *Q. Ballòta* of the nurseries; and, if so, these two alleged species must be only varieties of *Q. I'lex*; which, indeed, we believe to be the case. Q. *rígida* Willd. is probably also a variety of *Q. I'lex*; as appear to be Q. *castiliàna* Cav., Q. *prásina* Pers., Q. *rotundifòlia* Lam., and some others; but, not feeling perfectly confident on the subject, we shall treat them as uncertain kinds in our Appendix of European Oaks. Messrs. Lucombe and Pince inform us (while this is going through the press), that they have a new variety, which they call *Quércus* I'*lex ilicifòlia*; but we have not seen a specimen.

Description. In favourable situations, in the south of France, Spain, and Italy, and also in the warmest parts of England and Ireland, the *Q. I'lex* forms a bushy evergreen tree, exceeding the middle size. The trunk is generally furnished with branches from the ground upwards; and, being concealed by the dense mass of foliage borne by these branches, the general character of the species, even when fully grown, is that of an immense bush, rather than that of a timber tree. When judiciously pruned, or drawn up by other trees, however, it forms a handsome well-balanced head on a straight trunk, and with graceful pendent branches. The roots descend to a very great depth, altogether disproportionate to the height of the trunk; for which reason this oak is never found indigenous to soil with a wet bottom. The bark is black, thin, hard, and even; sometimes slightly furrowed, but never corky. The leaves vary exceedingly in shape and size, from 5 in. in length and nearly 3 in. in breadth (as in *Q. I.* latifòlia and *Q. I. fagifòlia*), to 1 in. in length and ½ in. in breadth (as in *Q. I.* críspa); or ½ in. in breadth and 3 in. in length, as in *Q. I. salicifòlia*. In some plants, the leaves are prickly, like those of the holly; and, when this is the case, the most prickly are nearest the ground; a circumstance beautifully exemplified in a fine tree at Purser's Cross. The colour of the leaves is a dark green; and, being convex above, and quite smooth, they have a fine shining appearance. Their edges are either revolute and entire, irregularly notched and serrated, furnished with mucros, or wavy and spiny-toothed, like the holly. Beneath, they are more or less hoary or downy; and in some varieties, such as *Q. I. fagifòlia*, they are on the under side very distinctly feather-nerved. The footstalks are from ½ in. to ¾ in. in length, and generally downy. The male flowers are disposed in catkins 1½ in. in length, which come out from the axils of the leaves of the preceding year, and towards the extremities of the branches. The calyx is campanulate, and the stamens 6, with filaments twice the length of the divisions of the calyx. The female flowers are from 4 to 8, sessile, and scattered along a common peduncle, which is from 1 in. to 2 in. in length, and is placed in the axils of the leaves of the current year. They are succeeded by acorns, which are oval, smooth, and contained in a cup of from a third to a half of their length, covered with very slender scales, very closely imbricated,



1781

and downy. It seldom happens that more than one or two of these acorns arrive at perfection on one peduncle. Some trees of this species produce acorns which are sweet and eatable; others produce only such as are bitter. Both bitter and sweet acorns are sometimes found on the same tree: and this important difference in taste and quality is accompanied by no difference whatever in their external appearance. According to the observation of M. De la Peyrouse, the sweetest acorns are found on trees which grow in warm dry situations. In the climate of London, seedling plants grow with considerable rapidity; attaining, in good loamy soil, from 15 ft. to 20 ft. in height in 10 years from the acorn. As they become larger, they grow slower; and, after they have attained the height of 30 ft. or 40 ft., they increase in width nearly as much as in height. The tree attains a great age, remaining in a growing state for several centuries. Bosc states that, when this species is cut down, it never grows up again as a tree, but forms a bush; which corresponds very well with the habit and character of the plant: but art, in the case of this tree, as in that of every other that stoles, might, doubtless, form a tree from a shoot produced by a stool, by bestowing proper attention on the selecting of a leading shoot, and on its future pruning and management.

Geography. The Quércus Ílex is a native of the south of Europe and the north of Africa. It is very common in Spain and Italy; and is indigenous, to France, as far north as Nantes and Angers. According to Bosc, it never grows in masses like forests; but it is dispersed here and there among other trees, more especially on hilly grounds, and near the sea. Captain S. E. Cook says that it grows in the first, or low and humid, region of Spain; and, alone, serves to indicate the difference of climate of that part of the Peninsula. In Sicily, it abounds on the hills all along the coast, and ascends Mount Etna as high as the Rocca dello Capre, which is 3200 ft. above the level of the sea, and within 800 ft. of the height to which *Q. Cérris* is found. (*Comp. to Bot. Mag.*, i. p. 91.) Both in its native country, and in Britain, it grows remarkably well close by the sea shore, where no other European oak will thrive.

History. This tree was well known to the ancients. Pliny mentions some holm oaks in existence when he wrote, which, according to his statement, must have then been, at the lowest computation, 1400 or 1500 years old. One tree, he says, grew in the Vatican, and was older than Rome itself. It had brazen letters, in the ancient Etruscan characters, fixed upon its trunk; from which it would appear, that, before the city was founded, or even the Roman name was known, this oak was a sacred tree. Three other ilexes, he records, were also then extant on the site of the ancient city of Tibur. The Tiburtines, he adds, were a more ancient people than the Romans, and their city, Tibur, was founded ages before Rome: yet these oaks were older even than Tiburtus, who built it; for tradition asserts that they were the sacred trees on which that hero beheld an omen, which he regarded as a warrant from the gods as to the spot on which to found his city. Now, Tiburtus was the reputed son of Amphiaraus, who died at Thebes 100 years before the Trojan war; and how long these oaks outlived Pliny, who flourished in the latter half of the first century of the Christian era, we have no record. (See *Amœn. Quer.*, fol. 18.) The ilex is frequently mentioned by Virgil, who, in the third *Georgic*, introduces a whole grove of them: —

> —— "Aut sicubi nigrum
> Ilicibus crebris sacrâ nemus accubet umbrâ."

He also mentions the acorns in the fourth *Georgic*, p. 81. Horace also speaks of the "iligna nutritus glande." (Lib. ii. sat. 4. l. 40.) Cato and Columella recommend the leaves of the ilex as a litter for sheepcotes, when straw cannot easily be procured; and Pliny states that the Romans sometimes made their civic crowns of it. The earliest notice which we have of the *Q. Ílex* in Britain is by Gerard, who, writing in 1597, says that "it is a stranger in England, notwithstanding there is here and there a tree thereof that hath been procured from beyond the seas." Johnson, in his edition of Gerard, published in 1636, says that Clusius, in 1581, "observed two trees; one in a garden about the

Bridge, and the other in the private garden at Whitehall, having lesser leaves than the former. The latter of these," he adds, "is yet standing, and every year bears small acorns which I could never observe come to any maturity." (*Ger. Emac.*, p. 1343.) Parkinson, in 1640, mentions the same tree as standing "in the king's privie garden at Whitehall;" and Evelyn, in 1678, speaks of it as a "sickly imp of more than fourscore years' growth." Gerard calls it the great skarlet oke; but Parkinson corrects him, and applies the name of the scarlet holm oke only to the true species, *Q.* coccífera, or, as he calls it, *Q.* coccígera. *Q.* I'lex was called the holm oak on account of the resemblance of the leaves of some of the varieties to those of the holly; though this term is more applicable to *Q.* gramúntia. Evelyn seems to have been one of the first to recommend the planting of this tree generally for hedges and standards; but the most extensive planter of the ilex was, doubtless, "that curious gentleman, Robert Balle, Esq., F.R.S., of Mamhead, in Devonshire," who raised some thousands of these trees from acorns, and transplanted them with so much success and judgment, that Bradley, writing about the beginning of the last century, says that some of them, in a few years, "had grown to a considerable greatness of stature." Some account of these trees will be found in the *Gardener's Magazine*, vol. xi.; by which it appears that the largest of them, which grows in a red loamy soil, on a substratum of redstone conglomerate, about 600 ft. above the level of the sea, was, in 1835, 85 ft. high, with a trunk 11 ft. in circumference; another was 70 ft. high, with a trunk 14 ft. in circumference; and a third was 55 ft. high, with a trunk 22 ft. in circumference. The *Q.* I'lex has ripened fruit at Marino, and other places, in the vicinity of Dublin; and it has attained a considerable size in Scotland, as will appear by our *Statistics*. It is much planted in France; and is by far the commonest evergreen in Italy, where the monotonous character which it gives to many of the celebrated gardens in the neighbourhood of Rome and Florence has obtained for it from Forsyth the appellation of "the eternal ilex." In the north of France, and in Germany, it is seldom met with except in green-houses; and it is also a greenhouse shrub in New York.

Poetical and historical Allusions. Most of the ancient writers, as well sacred as profane, appear to make a difference between the ilex and the common oak. According to Lowth, the teil tree mentioned by Isaiah (vi. 13.) was an ilex. Goodwyn, in his *Jewish Antiquities*, p. 75., observes that the holm oak was an object of worship among the Etruscans. Modern poets, particularly those of the south of Europe, also make occasional allusions to this tree. In Spain, Garcilasso says, —

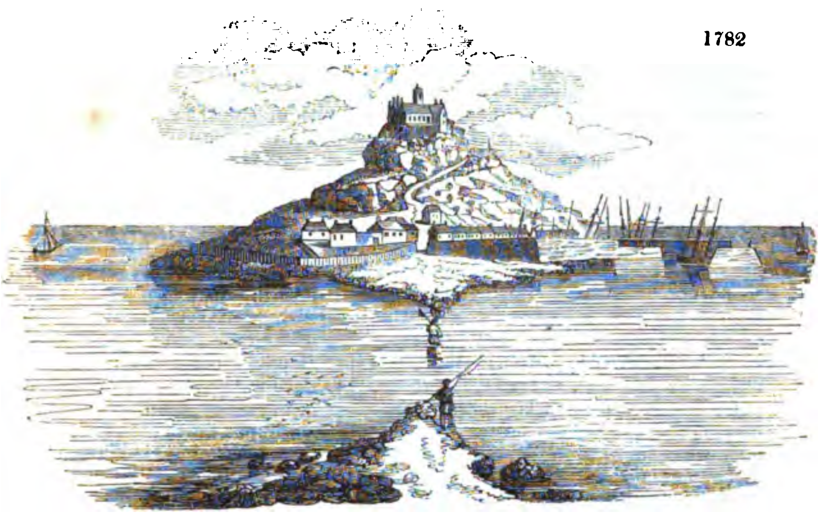
> —— "Hast thou forgotten, too,
> Childhood's sweet sports, whence first my passion grew;
> When from the bowery ilex I shook down
> Its autumn fruit, which on the craig's high crown
> We tasted, sitting chattering side by side?
> Who climb'd trees swinging o'er the hoarse deep tide,
> And pour'd into thy lap, or at thy feet,
> Their kernel'd nuts, the sweetest of the sweet?" WIFFEN'S *Garcilasso*, p. 215.

Garcilasso, in another poem, mentions both the oak and the ilex: —

> "But, in calm idlesse laid,
> Supine in the cool shade
> Of oak or ilex, beech or pendent pine,
> Sees his flocks feeding stray,
> Whitening a length of way,
> Or numbers up his homeward tending kine." *Ibid.*, p. 198.

Properties and Uses. The sap wood of the *Q.* I'lex is whitish; but the heart, or perfect, wood, is of a brown colour, very close-grained, heavy, and very hard; so much so, indeed, that, according to Parkinson, it is "not easie for an axe, but for a saw, to cut it." (*Theat. Bot.*, p. 1394.) It weighs 70 lb. to the cubic foot, and takes a fine polish; but twists and splits a great deal in drying, like most other hard and heavy woods. It is of great duration, and also of considerable flexibility; for which reason, in Languedoc, helves of hatchets and other instruments are made of it, and are found to preserve their

1782



flexibility, even when dry. Du Hamel observes that the great weight of this wood ought not to be considered a defect, even in the construction of vessels; because, if it is employed in the bottoms, it will serve instead of ballast; and, if it is employed on the upper parts, as it is much stronger than the common oak, it may be used of small dimensions. He recommends using it in preference to that of every other species of oak, wherever it can be obtained of sufficient size; more especially in cases where it has to resist friction. Evelyn says the wood of the ilex is serviceable for many uses; particularly for handles to tools, mallet heads, mall-balls, chairs, axletrees, wedges, beetles, pins, and palisadoes in fortifications. It supplies almost all Spain with the best and most lasting charcoal. Bradley and others recommend the wood for knee-timber for ships; and it has been strongly recommended for all these purposes, in a pamphlet by Isaac Weld, Esq. (See *Gard. Mag.*, vol. vi. p. 580.) Boutcher recommends the tree for making warm and lofty hedges, 40 ft. or 50 ft. high, in a short time; but he does not approve of planting them near a house, on account of the litter made by the leaves, when these are dropped in April and May. In Cornwall, *Q. I'lex* is considered preferable to every species of the genus for planting near the sea coast, either as an ornamental tree there, or for sheltering plantations of the common, or of the mossy-cupped, oak. The ilex has been strongly recommended for both these purposes by Mr. Rutger (see *Gard. Mag.*, vol. ix. p. 544.), who refers to St. Michael's Mount (*fig.* 1782.), which was planted with pinasters, and clothed with those trees for about 30 years, when they all began to decline; and, at 40 years from the time they were planted, there was scarcely a vestige of them left. About this time, plants of *Q. I'lex* were substituted for the pines; and these, which have now been planted about seven years, make a very fine appearance. In Spain, Captain S. E. Cook informs us, the encinas, or evergreen oaks, produce the best timber in the southern and middle regions of the Peninsula; but it is, he says, heavy, and unfit for most uses. "It is now, unfortunately, the only fire-wood in most parts of Castile, which is hourly diminishing the scanty stock that yet remains. The mode of cutting increases the evil; the practice of the peasantry being almost invariably to level the whole tract which they attack. The consequence is, that there is a tolerably vigorous spring from the stocks. This is soon cut, when a more feeble spring

takes place; after which operation being repeated a few times, every remnant is annihilated, and the country reduced to the open waste it now exhibits." (*Sketches in Spain*, vol. ii. p. 251.) In landscape-gardening, the ilex is of the greatest value, both as a tree and a shrub: in both characters, it forms very handsome single objects, or small groups; and, in both, it is a most desirable underwood in plantations of European oaks. It thrives better than most other evergreen trees in the immediate vicinity of cities, even where coal smoke abounds; and hence it is a most desirable tree for public parks and gardens, though there is not one in Hyde Park, the Regent's Park, or Greenwich Park. (See *Gard. Mag.*, vol. xiii. p. 155.)

Soil, Situation, &c. A dry deep soil, calcareous or sandy rather than clayey, and a situation low rather than elevated, best suit the ilex. It is exceedingly difficult to propagate, otherwise than by the acorn; and no tree, according to Boutcher, is more difficult to transplant; "as the roots of it, when not interrupted, run as straight down into the earth as a carrot, and with as few fibres; so that for hedges, or large plantations," Boutcher recommends the acorns "to be put into the places where they are designed to remain." (*Treat.*, &c., p. 168.) We agree in this advice; but, as it cannot always be followed, the next best mode is, to have the plants raised in small pots, one in a pot, as is generally practised in the London nurseries. So reared, the plants might be sent to any distance without the slightest injury; and, when they are turned out of the pot into the open ground, if the soil and situation be suitable, they will grow with amazing rapidity. In the year 1824, we turned a one-year's seedling out of a pot No. 60. into our garden at Bayswater, and it is now upwards of 20 ft. high, and has for three years past borne acorns.

Accidents and Diseases. The toughness and solidity of the wood of this tree, with the compact form of its head, render it less liable to be injured by wind or lightning than any other species of oak; while its coriaceous leaves are very seldom attacked by insects, at least in Britain.

Statistics. In the environs of London, at Fulham Palace, 150 years old, it is 45 ft. high, the diameter of the trunk 3 ft. 9 in., and of the head 40 ft.; at Syon it is 67 ft. high, the diameter of the trunk 2 ft. 1 in., and of the head 26 ft. A great many seedlings appear to have been planted here about the middle of the last century; and these now exhibit so great a diversity in their foliage, that many persons have been, till lately, in the habit of considering them as distinct species. At the Priory, at Stanmore, it is 44 ft. high, diameter of the trunk 2 ft., and of the head 32 ft.; and at Mount Grove, 18 years planted, it is 28 ft. high, the diameter of the head 20 ft.—South of London. In Cornwall, at Carclew, it is 40 ft. high, the diameter of the trunk 2 ft. 7 in. In Devonshire, at Bicton, 25 years planted, it is 14 ft. high; in the Exeter Nursery, 60 years old, it is 34 ft. high, the diameter of the trunk 2 ft. 6 in., and that of the head 44 ft.; at Killerton, 70 years planted, it is 50 ft. high, the diameter of the trunk 3 ft., and of the head 52 ft.; at Mamhead, it is 85 ft. high, circumference of the trunk 11 ft.; another is 55 ft. high, with a trunk 22 ft. in circumference: in Bystock Park, 22 years planted, it is 20 ft. high; at Endsleigh Cottage, 18 years planted, it is 30 ft. high. In Dorsetshire, at Melbury Park, 40 years planted, it is 30 ft. high, the diameter of the trunk 3 ft., and of the head 27 ft. In the Isle of Wight, in Wilkins's Nursery, 10 years planted, it is 20 ft. high. In Kent, at Cobham Hall, it is 60 ft. high, with a trunk 3 ft. 6 in. in diameter. In Somersetshire, at Leigh Court, 14 years planted, it is 28 ft. high; at Nettlecombe, 40 years planted, it is 31 ft. high, the diameter of the trunk 2 ft., and of the head 32 ft.; at Hinton House, 20 years planted, it is 27 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 20 ft. In Surrey, at Farnham Castle, 50 years planted, it is 35 ft. high; at Oakham, 30 years planted, it is 30 ft. high. In Wiltshire, at Wardour Castle, 50 years planted, it is 50 ft. high, the diameter of the trunk 2 ft. 10 in., and of the head 51 ft.—North of London. In Berkshire, at Ampthill, 16 years planted, it is 36 ft. high, diameter of the trunk 8 in., and of the head 24 ft.; at Bear Wood, 12 years planted, it is 11 ft. 6 in. high. In Cambridgeshire, in the Cambridge Botanic Garden, it is 35 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 33 ft. In Cheshire, at Tabley Hall, 70 years old, it is 36 ft. high, the diameter of the trunk 2 ft., and of the head 132 ft. In Denbighshire, at Kinmel Park, 24 years planted, it is 20 ft. high, diameter of the trunk 1 ft., and of the head 24 ft. In Lancashire, at Latham House, 60 years planted, it is 31 ft. high, diameter of the trunk 2 ft. 6 in., and of the head 54 ft. In Middlesex, at Harefield Place, are some remarkably large trees, supposed to have been planted in the days of Evelyn, and by his suggestions. (See *Gard. Mag.*, vi. p. 580.) In Northamptonshire, at Wakefield Lodge, 14 years planted, it is 20 ft. high. In Nottinghamshire, at Wollaton Hall, are several immense ilexes, one has the trunk 15 ft. 6 in. in circumference at 1 ft. from the ground, and the diameter of the head is 67 ft.; there are two others, of nearly the same size: they are supposed to be of the same age as Wollaton Hall, which was built by Thorp in the time of Elizabeth, and consequently to be nearly 300 years old. (See an engraving of this remarkable mansion in *Gard Mag.*, vol. ii. fig. 130. In Oxfordshire, in the Oxford Botanic Garden, 12 years planted, it is 20 ft. high. In Pembrokeshire, at Stackpole Court, 100 years old, it is 78 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 50 ft. In Radnorshire, at Maeslaugh Castle, 50 years planted, it is 36 ft. high the diameter of the trunk 1 ft. 9 in., and of the head 34 ft. In Staffordshire, at Trentham, 15 yearsplanted, it is 29 ft. high. In Suffolk, in the Bury Botanic Garden, 60 years planted, it is 45 ft. high; at Bungay, it is 50 ft. high, the diameter of the trunk 3 ft., and of the head 60 ft.; at Great Livermere, 9 years planted, it is 15 ft. high. In Westmoreland, at Holker Hall, it is 58 ft. high. In Worcestershire, at Croome, 80 years planted, it is 70 ft. high, the diameter of the trunk 4 ft., and of the head

90 ft.—In Scotland, in the environs of Edinburgh, at Newbattle Abbey, it is 45 ft. high, the diameter of the trunk 4 ft. 9 in., and the head 70 ft.; at Hopetoun House, it is 40 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 30 ft.; at Dalhousie Castle, 15 years planted, it is 11 ft. high, raised from acorns gathered by Lord Dalhousie, while he rode over the field of battle at Salamanca; and sent home in 1812. — South of Edinburgh. In Ayrshire, at Fullerton, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 26 ft.; another, 120 years old, is 40 ft. high, and the diameter of the trunk is 3 ft. In the stewartry of Kircudbright, at St. Mary's Isle, it is 48 ft. high, the diameter of the trunk 1 ft. 9 in., and of the head 35 ft.; at Bargally is one with a trunk 11 ft. 8 in. in circumference; at Cassincarrie, it is 40 ft. high, with a trunk 9 ft. 6 in. in circumference. — North of Edinburgh. In Aberdeenshire, at Gordon Castle, it is 32 ft. high, the diameter of the trunk 2 ft., and of the head 39 ft. In Banffshire, at Cullen House, it is 37 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 30 ft. In Cromarty, at Coul, it is 30 ft. high, the diameter of the trunk 10 in. In Fifeshire, at Raith House, it is 35 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 23 ft. In Ross-shire, at Brahan Castle, 20 ft. high, the diameter of the trunk 10 in. In Stirlingshire, at Braham Castle, 26 ft. high, the girt of the trunk 2 ft. 6 in., and the diameter of the head 20 ft.—In Ireland, in the environs of Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 24 ft. high, the diameter of the trunk 1 ft.; at Castletown, it is 35 ft. high, the diameter of the trunk 3 ft. 6 in., and of the head 54 ft. — South of Dublin, in the county of Cork, at Castle Freke, 26 years planted, it is 36 ft. high, the diameter of the trunk 1 ft., and that of the head 33 ft. In Kilkenny, at Borris, it is 49 ft. high, the circumference of the trunk 11 ft., and the diameter of the head 54 ft. — North of Dublin. In the county of Antrim, at Echlinville, 37 years planted, it is 39 ft. high, the circumference of the trunk 8 ft., and the diameter of the head 43 ft.. In Down, at Moira, it is 45 ft. high, the diameter of the trunk 1 ft. 6 in., and that of the head 35 ft. In Fermanagh, at Castle Coole, 33 ft. high, the diameter of the trunk 1 ft., and of the head 21 ft.—In France, in the Jardin des Plantes, 40 years planted, it is 24 ft. high, the diameter of the trunk 1 ft., and of the head 20 ft.; another, 130 years old, is 42 ft. high, with a trunk 5 ft. in circumference; at Scéaux, 30 years old, it is 30 ft. high, with a trunk 1 ft. 6 in. in diameter, and the diameter of the head 20 ft.; in the Botanic Garden at Avranches, 40 years planted, it is 39 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 28 ft.—In Austria, near Vienna, at Kopenzel, 30 years planted, it is 25 ft. high.

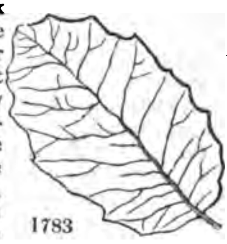
Recorded Trees. At Wilton House, *Q. I'lex*, in 1816, had a trunk 10 ft. in circumference; and one at Chichester, planted by Colonel Brereton, in 1766, had a trunk 7 ft. high, and 7 ft. 6 in. in circumference. Goodwood Park Lodge, near Chichester, is covered by a screen of evergreen oaks, in the form of a square, 10 ft. thick, and 30 ft. high. (*Mitch. Dend.*, p. 224.) In Scotland, at Bargally in Galloway, *Q. I'lex*, measured in 1780, was 50 ft. high, with a clear trunk of 12 ft., which measured 6 ft. 3 in. in circumference at 4 ft. from the ground: it had at that time many acorns on it. (*Walker.*) In Ireland, at Mount Asher, there were some evergreen oaks, which, in 1794, had trunks from 6 ft. to 8 ft. in circumference. At Kilruddery, the *Q. I'lex* grows as well as in Italy; and there are very large trees of it. (*Id.*, p. 124. and 132.)

Commercial Statistics. Plants, in the London nurseries, from 1 ft. to 2 ft. high, in pots, are 75*s.* per hundred; or single plants from 6*d.* to 2*s.* each, according to their size; and acorns are 20*s.* per bushel. At Bollwyller, where it is tender, plants are 1 franc and 50 cents; and at New York, where they are 1 dollar each, they are noticed in Prince's *Catalogue* as requiring protection in winter.

♣ 30. *Q. BALLO'TA* Desf. The sweet Acorn Oak.

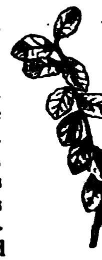
Identification. Desf. Atl., 2. p. 350.; Hist. des Arb., 2. p. 506.; Willd. Sp. Pl., 4. p. 432.; N. Du Ham., 7. p. 157.; Smith in Rees's Cycl., No. 31.
Synonymes. ? *I'lex major Clus. Hist.*, 1. t. 23.; Chêne à Glands doux, Chêne Ballote, *Fr.*
Derivation. The term *Ballòta* seems to be a modification of the Spanish word *bellota*, which means acorns generally.
Engravings. Our *figs.* 1783. and 1784., the latter being a sprig, and the former a leaf of the natural size, both taken from a specimen of the original tree, planted by Desfontaines in the Jardin des Plantes, at Paris.

Spec. Char., &c. Leaves elliptical, coriaceous, denticulated, or entire; downy beneath. Bark even. Nut cylindrical, elongated. (*Desf.* and *Smith.*) A tree, growing 20 ft. or 30 ft. high, with a trunk from 3 ft. to 6 ft. in circumference. The branches are covered with a bark somewhat furrowed, of a brownish grey; and the general form of the head of the tree is oval, or roundish. The leaves are coriaceous, with short footstalks, generally rounded at the summit, rarely pointed; smooth above, and cottony and white beneath; entire or denticulated in their margins. The female flowers are solitary, or in clusters, in the axils of the young shoots. The acorns are sessile, or on short peduncles; the fruit is from 8 to 20 lines in length, and from 4 to 6 lines in breadth. The nuts are enclosed at the base in a hemispherical cup, covered with obtuse scales, which are cottony, numerous, and very closely imbricated. This oak was discovered by Desfontaines, in Barbary, and it is said to be closely allied to *Q. I'lex*; from which, however, it differs in its leaves being more white and cottony beneath, and of a more coriaceous texture; and in its



1783

acorn being of double the length of that of Q. I'lex, and in having a mild and agreeable taste. The tree varies much, according to the soil and situation in which it grows. In some individuals, the leaves are small and orbiculate; and in others elliptic; and sometimes they are lanceolate and pointed. It flowers in May, and ripens its fruit in the autumn of the second year. (*N. Du Ham.*, vii. p. 157.) *Q. Ballòta*, according to Desfontaines (*Jour. de Physique*, tom. xxxviii., for 1791), grows in great abundance in the kingdoms of Algiers and Morocco. There are vast forests of this tree on the mountains; but it is only found in small quantities on the plains. The Moors eat the acorns raw, or roasted in ashes: they are found very nourishing, and are not bitter. They are regularly sold in the market-places; and, in some districts, an oil is expressed from them, which is nearly as good as that of the olive. We have no doubt that this kind of oak is merely a variety of Q. I'lex, though the specimen sent to us from Paris shows it to be very distinct. Indeed, if we were to judge entirely from that specimen, we should say that Q. *Ballòta* was much more likely to be a variety of Q. gramúntia than of Q. I'lex; and, in short, it may be identical with it, because Q. gramúntia is not described by Desfontaines. Captain S. E. Cook, who paid great attention to the oaks of Spain, mentions only the term bellotas as a name for acorns generally; and he considers the Q. *Ballòta* of the nurseries to be the Q. valentìna of Cavanilles, which has bitter acorns. The Q. *Ballòta* of the Horticultural Society's Garden, and of some of the British nurseries (see our *fig.* 1785), of which a leaf of the natural size is shown in *fig.* 1786., is a totally different plant from either the Q. *Ballòta* of Paris, or the Q. valentìna of Cavanilles, and in short, is nothing more than a Q. I'lex; so that the true Q. *Ballòta* of Desfontaines may be the Q. gramúntia, which we suspect it is. Bosc observes that, in the Paris gardens, it requires to be taken into the conservatory in winter: but it is to be recollected that the Q. I'lex requires similar protection in that part of France; and, therefore, there can be little doubt but Q. *Ballòta*, if it is different from Q. gramúntia, would be hardy in the neighbourhood of London.



1784



1786



1785

♀ ▲ 31. Q. GRAMU'NTIA *L.* The *Holly-leaved* Grammont Oak.

Identification. Lin. Sp. Pl., 1413.; Willd. Sp. Pl., 4. p. 432.; Ait. Hort. Kew., ed. 2., 5. p. 289.; N. Du Ham., 7. p. 158.; Smith in Rees's Cycl., No. 30.

Synonymes. ? I'lex fòliis rotundiòribus, &c., *Magn. Monsp.*, 140.; Chêne de Grammont, *Fr.*; Wellenblättrige Eiche, *Ger.*; Encina dulce, and Gouetta, *Span.* Captain S. E. Cook suggests that Q. hispánica would be the most suitable name for this species, which may be considered as forming the natural oak of Spain; whereas the term gramúntia was applied to it by Linnæus, from its having been found in the remnant of a wood on the estate of Grammont, near Montpelier, where, according to De Candolle, the species no longer exists.

Engravings. Our *fig.* 1787., from the tree at Purser's Cross; *fig.* 1788., an acorn of the natural size, traced from one that was sent to us by Capt. Cook; and the plate of the tree at Purser's Cross in our last Volume.

Spec. Char., &c. Leaves roundish-elliptical, nearly sessile, undulated, with deep, spinous, divaricated teeth; densely downy beneath; heart-shaped at the base. Native of the wood of Grammont, near Montpelier; and of Spain. Cultivated in England in 1730. It blossoms in June, and ripens its fruit in the autumn of the following year. This is rather a small straggling tree, with numerous round grey branches, downy when young. Leaves scarcely 1 in. long, rigid, broadly elliptical, often nearly orbicular; very much undulated at the margin, their deep, broad, spinous teeth pointing every way, like those of the holly; the upper surface dark green, rather glaucous, besprinkled with minute starry hairs; the under surface densely clothed with white entangled down. (*Smith.*) In the *Nouveau Du Hamel*, great doubts are expressed as to whether this species is identical with the Q. rotundifòlia of



1787

Lamarck; and whether both sorts may not be merely varieties of Q. I'lex. Sir J. E. Smith says Linnæus confounded a variety of Q. I'lex, which he had received from Magnol's herbarium, with Q. gramúntia, which Smith, as quoted above, has correctly described, apparently from a living plant. From a tree bearing this name at Purser's Cross, which produces fruit annually, this oak certainly appears to be closely allied to Q. I'lex; but it is, nevertheless, very distinct, and is, doubtless, as well entitled to be considered a species as many others recognised as such by botanists. Captain S. E. Cook, who paid great attention to this oak when in Spain, has the following remarks on it: — "This species is quite distinct from the Q. I'lex, its nearest congener. The leaves are thicker, more rounded at the point, of a dull glaucous green, and the tree altogether is of a more compact and less graceful form than the Italian ilex. The great and essential difference, however, consists in the acorns, which are edible, and, when in perfection, are as good as, or superior to, a chestnut. To give this sweetness, they must be kept; as, at first, they have a considerable taste of the tannin, like those of the other species, which disappears in a few days, and accounts for the scepticism of some writers, who assert that both sweet and bitter are the produce of the same tree, and that their sweetness is no character. These are the edible acorns of the ancients, which they believed fattened the tunny fish on their passage from the Ocean to the Mediterranean; a fable only proving that the acorns grew on the delicious shores and rocks of Andalusia, which, unhappily, is no longer the case. Remains of them may, however, still be traced in the west; and they fattened the swine which produced the celebrated salted meats of Malaga and that vicinity. These are the bellotas, which Teresa, the wife of Sancho Panza, gathered herself in La Mancha, where they grew in the greatest perfection, and sent to the duchess, wishing, instead of their being only the best of their kind, they were the size of ostrich eggs. I have frequently seen them produced by individuals, and offered to the company, as *bon-bons* are in some countries, with a sort of apology for their small intrinsic value, from their size and flavour. This species is, beyond question, very hardy; I believe even more so than the ilex of Italy. It ascends the sides of the sierras in the inclement region of the centre of Castile; and, in Arragon, is seen within the limits of the Pìnus sylvéstris and P. uncinàta; as also in the cold and wintry valley of Andorre. The widest forests of it are now in Estremadura, where the best sausages, and other salted meats, are made from the vast herds of swine which are bred in them. This species ought to be denominated Q. hispánica, instead of a weak and obscure name from a wood (which, I have heard, no longer exists), where the tree may possibly not have been a native, although the climate and soil of Lower Languedoc very much resemble that of the two regions of Spain to which this tree is confined." (*Sketches in Spain*, vol. ii. p. 246.) As a proof of the hardiness of this tree, Dralet mentions that he found it growing on the crest of the mountains of the Andorras, where the snow covers the surface for several months during the year; and this circumstance, he says, explained to him the reason why the kings of Spain had succeeded in getting it to grow in the park at the Prado, near Madrid, where they had tried in vain to cultivate the olive. (See *Traité*, &c., p. 176.; see, also, *Gard. Mag.*, vol. iv. p. 69.)



1788

In the climate of London, this tree is perfectly hardy; as a proof of which it may be mentioned that the specimen already referred to, at Purser's Cross, which is upwards of 40 ft. high, and of which the plate in our last Volume is a portrait, ripens its fruit every year. From the leaves of this tree, and those of the specimen of *Q. Ballòta* sent to us from Paris, we are strongly inclined to think, as we have already stated (p. 1906.), that the latter was a variety of *Q.* gramúntia, rather than of *Q. I'lex*; and this is also the opinion of M. Dralet. The rate of growth of *Q.* gramúntia is much slower than that of *Q. I'lex*. There are plants in the Horticultural Society's Garden, at Messrs. Loddiges's, and in the London nurseries. Small plants, in pots, are from 1*s*. 6*d*. to 3*s*. 6*d*. each.

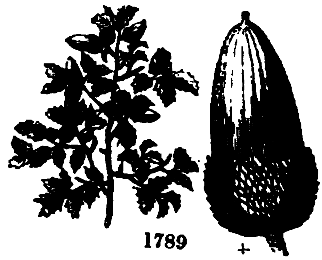
■ 32. *Q.* COCCI'FERA *L.* The *Kermes, or* berry-bearing, Oak.

Identification. Lin. Sp. Pl., 1413.; Willd. Sp. Pl., 4. p. 433.; Ait. Hort. Kew., ed. 2., 5. p. 289. N. Du Ham., 7. p. 160.; Smith in Rees's Cycl., No. 34.; Lodd. Cat., ed. 1836.

Synonymes. I'lex coccífera *Cam. Epit.*, 774.; *I.* aculeàta cocciglandífera *Garid. Aix.*, p. 245., *Nissolle* in *Mém. Acad. Scien.* for 1714, p. 435.; *I.* coccígera *Ger. Emac.*, p. 1342., *Parkinson Theat. Bot.*, p. 1395.; Chène aux Kermes, *Fr.*; Kermes Eiche, *Ger.*

Engravings. Garid. Aix., t. 53.; Mém. Acad. Scien., 1744, t. 17, 18.; N. Du Ham., 7. t. 46.; Wats. Dend. Brit., t. 91.; and our *fig.* 1789. from the N. Du Ham., *fig.* 1790. from Watson, reduced to the usual scale, and *figs.* 1791. and 1792. of the natural size.

Spec. Char., &c. Leaves elliptic-oblong, rigid; smooth on both sides, with spreading, bristly, spinous teeth. Fruit on peduncles; nut ovate. Calyx with spreading, pointed, somewhat recurved scales. (*N. Du Ham.*) A low bushy shrub, a native of the south of Europe and the Levant; flowering in May. The whole plant resembles a holly in miniature; but the leaves are of a paler green. It varies exceedingly in the magnitude of the leaves, as may be seen by comparing *fig.* 1791. with *fig.* 1792., both of the natural size; the former from a plant in the Goldworth Arboretum, and the latter from one in the Epsom Nursery. The leaves in the one specimen are nearly four times the length of those in the other. This oak was cultivated in Britain previously to 1683, and is well known as producing the kermes, or scarlet grain, of commerce.

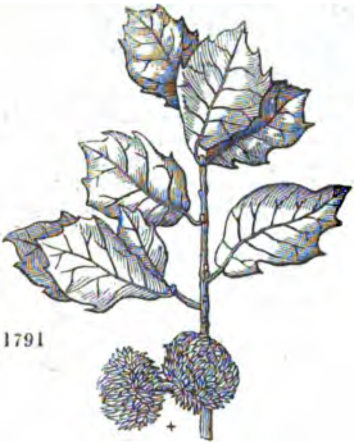


1789 +

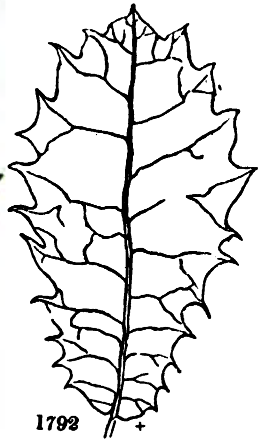
This shrub divides at the ground into a great number of tortuous spreading branches, so as to form a bush of from 3 ft. to 5 ft. in height. The leaves are oval, on short petioles, coriaceous; shining above, glabrous on both sides; sometimes quite entire on their margins, but more frequently bordered with scattered spiny teeth, like the leaves of the common holly. The male flowers are on long slender peduncles: the female flowers are sessile, from 3 to 7 in number, on a rachis from 8 to 15 lines in length: only two or three of these flowers come to maturity. The fruit is but of a very small size the first year, and does not attain maturity till the end of the second. The nuts are oval, and are enveloped for half their length in a cup furnished with rough scales terminating in rough points, which are almost woody, spreading, and a little recurved. (*Id.*, vii. p. 160.) Bosc, in his *Mémoire sur les Chênes*, says that he has seen this species covering entire hills in Leon and Old Castile, and in other parts of Spain, where it greatly injures the cattle, and especially the sheep, which can only eat the very young shoots. The bushes, he says, are only employed as fuel, though they would be useful in the tannery, or for dyeing. There is now, he says, little demand for the kermes, because it cannot be afforded so



+ 1790



1791



1792

cheap as the cochineal; and, therefore, only very small quantities of it are brought to market. This species is not unfrequent in British collections, where, however, it is somewhat tender, and of very slow growth. It is propagated from the acorns, which are received from the Continental nurserymen; and small plants, in pots, are from 1*s*. 6*d*. to 3*s*. 6*d*. each.

The Kermes. The specific name of coccífera has been applied to this species in consequence of its affording nourishment to a species of Cóccus, or scale insect (Cóccus Ílicis *Lin. Syst. Nat.*, 2740., No. 6.); though the student of the *Systema Naturæ* will at once perceive the impropriety of the Linnæan application of these names, Cóccus and *Chérmes*, the latter being applied to another totally distinct genus of minute homopterous insects allied to the plant lice, to which, from their saltatorial powers, Geoffroy gave the name of *Psýlla*, with much greater propriety; employing, however, both Cóccus and *Chérmes* as generic names of insects belonging to the family Cóccidæ. The insect in question is also known under its Arabian name, Chermes or Kermes; Scharlachbeeren, *Ger.*; Grein Scharlakbessen, *Dutch*; Grana Chermes, Cremese, or Cocchi, *Ital.*; Grana Kermes, or Grana de la Coscoja, *Span.*; and Alkermes, *Persian*; and, previously to the discovery of the New World, was employed to a very great extent in dyeing, producing a very permanent and rich blood-red colour. It will be seen, from the accompanying figure (*fig.* 1793.), that this parasitic insect has all the appearance of a berry or seed, affording not the slightest indication of its insect nature; being immovably affixed in clusters to the branches of the oak, upon which it subsists, by introducing into the substance of the stem a long and delicate haustellum. It is only, however, at the close of its existence that it assumes the form of a seed. Mr. M'Culloch, indeed, states that it is in the process of drying that this form is acquired; but this is not correct, since, although the insect is provided with legs, and, when



1793

young, possesses locomotive powers, yet, after impregnation, it greatly increases in size, and the eggs are deposited beneath the body; so that, by degrees, as the eggs are excluded, the two surfaces of the body come together, and form a covering for the eggs: hence, it will be observed that it is only the females which are collected; the males, in the perfect state, being minute, active, two-winged flies, totally unlike their inert partners. This production has been in use amongst the Eastern nations from the earliest ages. It was known to the Phœnicians, before the time of Moses, under the name of tola, or thola (תולע); to the Greeks, under that of coccus (κοκκος); and, to the Romans, under that of coccum, or coccus baphica; whence the origin of the terms coccus and coccinum, which were given to cloth dyed with kermes; whilst persons wearing this kind of cloth were said by the Romans to be coccinati (*Mart.*, lib. i. epig. 97. lin. 6.) From the peculiar character of this production, it is not surprising, that its real nature was long unknown. By some of the early naturalists, it was regarded as the fruit of the tree upon which it was found; and by others, who discovered the real organs of fructification of the tree, that it was a vegetable excrescence similar in its nature to the galls caused by the punctures of the Cynípidæ. This opinion was maintained even in 1711, by M. De Marsigli, in a dissertation written at Bologna, and addressed to M. Vallisnieri. In 1714, however, M. Cestoni addressed a letter to the same philosopher, in which he clearly traced the identity of the nature of the kermes, and that of the scale insects of the orange and other trees. This letter is printed in the collection of the works of Vallisnieri, with a short preface by the latter, who appears to have hesitated in adopting the opinion of M. Cestoni. Very shortly afterwards, however, the entire history of the insect was traced by Messrs. Garidel and Emeric, correspondents of the Academy of Paris; who, prompted by M. Tournefort, by daily examinations of branches infected with the kermes, made themselves fully acquainted with its history, and proved it to be a species of Cóccus. (*Garid. Aix. Env.*, 250., t. 53. and 2.) Réaumur has also given a full account of it in his *Mémoires*, tom. iv. mém. 1. pl. 5. In its natural state, the kermes is of a shining appearance, and of the colour of a plum covered with a whitish bloom. In the state in which it is brought into the market, it appears of a dull reddish brown; which is not, of course, the natural colour of good kermes, but is imparted to it by steeping it in vinegar. The inhabitants of the countries where the kermes is obtained, distinguish three different stages in its existence. In the Provençal language, they call it "le ver," and say of it, when it is in its earliest state of activity, "Le ver couve;" subsequently, in the month of April, when the kermes becomes stationary, and begins to attain its fullest size, they say, "Le ver commence d'éclore;" and, in its last state, in the middle or towards the end of May, the insect is found reduced to a skin, covering its brood of eggs, to the number of 1800 or 2000. The crop of kermes is more or less abundant, according to the state of the preceding winter; when, therefore, there has been no frost, and the weather has been generally mild, a good crop is expected, which is not obtained every year; and, as there is no trouble in planting or attending to the growth of the kermes, and as no other instruments are required than long nails to the fingers, it may be easily supposed that the harvest is a very unexpensive one. Females are employed in collecting the kermes in the morning, before the dew is off the ground; at which time the leaves and the prickles of the plants are less to be dreaded. Experienced persons will thus collect a couple of pounds' weight per diem. Belon (*Observations des Singularités*, liv. i. p. 19.) has given considerable details respecting the gathering of the crops of kermes; and states that the price decreases considerably during the gathering, in consequence of the latest-collected kermes being lighter than those first obtained, owing to the young ones having escaped. The merchants who purchase the kermes immediately steep them in vinegar, and then expose them to the action of heat sufficient to destroy any remaining vitality in the young: this process considerably alters the colour of the insect, and

gives it that red hue for which it has been so long celebrated; and which is of so very permanent a nature, that, according to M'Culloch (*Dict.*, art. Kermes), the old tapestries of Brussels, and other parts of Flanders, although manufactured more than a couple of centuries, have lost none of their richness of tint. Beckmann has introduced in the account of this production given in his *History of Inventions*, vol. i. p. 171—191., first edit. trans., all that was known of it in his time. Since the discovery of America, the Cóccus cácti (or cochineal) has, however, in a great degree supplanted the Cóccus ílicis. Mr. M'Culloch erroneously states that the kermes is of the same species as the true Mexican cochineal. The kermes, nevertheless, is still extensively prepared in some parts of Spain, India, and Persia; and Dr. Bancroft (*On Permanent Colours*, i. 303—409.) states that, with the solution of tin, which is used with the cochineal, the kermes is capable of imparting a scarlet quite as brilliant as that dye; and perhaps more permanent. At the same time, however, as 10 or 12 pounds contain only as much colouring matter as one of cochineal, the latter, at its ordinary price, is the cheaper.—*J. O. W.*

♀ ■ 33. Q. PSEU'DO-COCCI'FERA *Desf.* The false berry-bearing *Kermes*, *or* Oak.

Identification. Desf. Atl., 2. p. 349.; Willd. Sp. Pl., 4. p. 432.; N. Du Ham., 7. p. 160.; Smith in Rees's Cycl., No. 35.
Synonymes. Chêne à faux Kermes, *Fr.*; Stecherde Eiche, *Ger.*
Engravings. N. Du Ham., t. 48. f. 1.; and our *fig.* 1794.



1794

Spec. Char., &c. Leaves elliptic-oblong, rigid, smooth on both sides, with spiny serratures. Nut ovate. Calyx with flat slightly spreading scales. (*Desf.*) "Observed by Desfontaines at Algiers and about Mount Atlas. At Tunis it is called the "meal-bearing oak," probably from the use of the acorns as food. It forms a tree from 15 ft. to 20 ft. high, with round branches, clothed with rusty down when young. The leaves are twice or thrice as long as those of Q. coccífera, thicker, and less wavy, with much smaller and shorter spinous serratures, rather than teeth. Calyx clothed with numerous, flat, short, slightly spreading scales. Nut ovate, pointed. In the *Nouveau Du Hamel*, it is supposed to be a native of Provence, as well as of Algiers. From the engraving in that work, of which *fig.* 1794. is a reduced copy, it appears to be intermediate between Q. Ílex and Q. coccífera. A plant bearing this name in 1837, in the Horticultural Society's Garden, is considered by Dr. Lindley as a different species. (See App. i.)

♀ 34. Q. SU'BER *L.* The Cork Tree.

Identification. Lin. Sp. Pl., 1413.; Willd. Sp. Pl., 4. p. 433.; Ait. Hort. Kew, 5. p. 289.; N. Du Ham., 7. p. 159.; Smith in Rees's Cycl., No. 33.
Synonymes. Sùber *Cam. Epit.*, 115.; S. Prìnus *Matth. Valgr.*, 1. p. 127.; S. latifòlium, &c., *Du Ham. Arb.*, 2. p. 291., *Ger. Emac.*, 1347.; Chêne Liège, *Fr.*; Kork Eiche, *Ger.*; Alcornoque, *Span.*
Engravings. Hunt. Evel. Syl., t. in p. 362.; N. Du Ham., 7. t. 45.; Dend. Brit., t. 89.; our *figs.* 1797. and 1798.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves ovate-oblong, bluntish, coriaceous; entire, or sharply serrated; downy beneath. Bark cracked, fungous. (*Willd.*) A tree, growing to the height of 20 ft. or 30 ft. in the south of Europe and north of Africa; well known as being the only tree producing that important article, cork, in sufficient quantities for commerce. It was introduced in or before 1699, by the Duchess of Beaufort; and, being readily propagated by acorns, which are received from France and Spain, and sometimes ripened in England, it is not unfrequent in collections; and, in some gardens, it forms a very handsome tree.

Varieties. These, we have no doubt, are as numerous as the varieties of Q. Ílex, in countries where the tree is indigenous. None are in cultivation in British gardens under any particular name: but their leaves, in different places, the cork trees having been all raised from seed, will be found to vary in magnitude, in length relatively to breadth, and in the character of their margins, which are either wavy, serrate, or dentate. The most striking variety which we have seen is at Muswell Hill, and is represented at *fig.* 1796. of the natural size; *fig.* 1795. representing a specimen of the species, also from a tree at Muswell Hill. This variety differs so remarkably from the species, that some consider it as Q. Pseùdo-Sùber: but that species, according to Bosc, the *Nouveau Du Hamel*, and the plants in the Horticultural Society's Garden and at Messrs. Loddiges's, is decidedly deciduous; and, in its buds and mossy cups, has more the character of Q. Cérris than of Q. Sùber. We acknowledge, however, that the leaves of the plant at

1795





1796

Muswell Hill bear a considerable resemblance, both in form and size, to the figure of *Q.* Pseùdo-*Sùber* given in the *Nouv. Du Hamel*, and of which *fig.* 1801. is a reduced copy. The tree at Muswell Hill has ripened acorns, but not lately, and the character of their cups is forgotten; otherwise we should at once be able to decide to which section it belongs. The trunk is covered with a corky bark, which has exactly the appearance of that of the true cork tree in the same garden; but the cork is only 2 in. or 2½ in. in depth, while in the true cork tree it is more than 3 in. deep. Whether this is a variety or a species, it is, at all events, so decidedly distinct in the foliage, and, as the plate in our last Volume will show, forms such a very handsome evergreen tree, that it well merits a place in collections. When we saw the trees (May 5. 1837), both were in full foliage; but we were informed that the variety lost its leaves generally before the other. Our

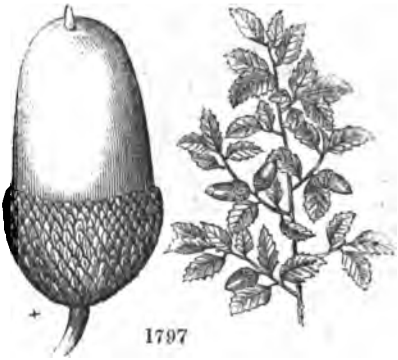
drawings of the two trees were taken nearly a month afterwards, when they had exactly the appearance shown in our last Volume. In order that the variety may be kept distinct by propagators, we have given it a name among the others, as below.

¥ Q. S. 2 *latifòlium*, Sùber latifòlium, &c., *Bauh. Pin.*, 424, *Du Ham. Arb.* 2. p. 291. t. 80., has the leaves rather broader than the species, and either serrated or entire. The tree at Muswell Hill, between 30 ft. and 40 ft. high, figured in our last Volume, we may suppose to be of this entire-leaved subvariety.

¥ Q. S. 3 *angustifòlium*, Sùber angustifòlium *Bauh. Pin.*, 424., *Du Ham. Arb.*, 2. p. 291. t. 81.—The portrait in our last Volume of a tree in the Fulham Nursery, 27 ft. high, and of which there is a botanical specimen given in Watson's *Dend. Brit.*, t. 89., and our *fig.* 1798., may be considered as belonging to this variety.

¥ Q. S. 4 *dentàtum*, the *Q.* Pseùdo-Sùber of Muswell Hill, has the leaves large, and variously dentate, as in *fig.* 1797. The tree of this variety at Muswell Hill, figured in our last Volume, is between 50 ft. and 60 ft. high.

Description, &c. The cork tree bears a general resemblance to the broad-leaved kinds of *Q. I'*lex; of which species some authors consider it only a variety: but, when full grown, it forms a much handsomer tree; and its bark alone seems to justify its being made a species. It would appear to be rather more tender than the ilex; since the severe winter of 1709 killed to the ground the greater part of the cork trees of Provence and Languedoc; and the frost of 1739-40, one of the original trees in the Chelsea Botanic Garden. Like the ilex, it varies exceedingly in the magnitude, form, and margins of its leaves, and also in the size of its fruit. The nut, according to Bosc, is more sweet than that of the ilex, and may be eaten as human food in cases of necessity. Swine, he says, are exceedingly greedy of these acorns, and get rapidly fat on them, producing a firm and very savoury lard. The Spaniards eat the acorns roasted, in the same manner as they do those of *Q.* gramúntia, and as we do chestnuts. The outer bark, the great thickness and elasticity of which is owing to an extraordinary developement of the cellular tissue, forms the cork; which, after the tree is full grown, cracks and separates from it, of its own accord. The inner bark remains attached to the tree, and, when removed in its young state, is only fit for tanning. Both outer and inner bark abound in tannin; and the former contains a peculiar principle called suberine, and an acid called the suberic. The tree is found wild in dry hilly places in the south of France, in Italy, in great part of Spain, and in the north of Africa. In Spain, according to Captain S. E. Cook, it is most abundant in Catalonia and Valencia. The wood of the cork tree, which weighs 84 lb. per cubic foot, is used for the same purposes as that of *Q. I'*lex; but it is never found of sufficient size to be of much consequence. By far the most important product, however, which this tree yields, is its outer bark. This, which is the cork of



1797

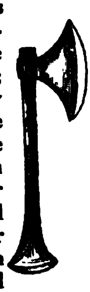


1798

commerce, appears to have been applied to useful purposes, even in the time of the Romans; since Pliny mentions a kind of buckler lined with cork, and that the Roman women lined their shoes with it; the latter being a practice which is common all over the civilised world at the present day. Both Greeks and Romans appear to have used it occasionally for stoppers to vessels, "cadorum obturamentis" (*Plin. Hist. Nat.*, lib. xvi. cap. 8.); but it was not extensively employed for this purpose till the 17th century, when glass bottles, of which no mention is made before the 15th century, began to be generally introduced. (See *Beckmann's Hist. of Invent.*, vol. ii. p. 114—127., Eng. ed.) In modern times, besides the employment of cork for stoppers to bottles, and bungs to vessels of various kinds, and for lining the soles of shoes, and sometimes other articles, it is used by fishermen for supporting their nets, and by anglers for trolling and other kinds of fishing. It is employed in the construction of life-boats, and also for what are called life-jackets, to enable those to float who cannot swim. In Evelyn's time, cork was much used by old persons for linings to the soles of their shoes; whence the German name for it, pantoffelholtz, or slipper-wood. The Venetian dames, Evelyn says, used it for their choppinges, or high-heeled shoes; and "the poor people in Spain lay planks of it by their bedside to tread on, as great persons use Turkey and Persian carpets, to defend them from the floor. Sometimes, also, they line the inside of their houses built of stone with this bark, which renders them very warm, and corrects the moisture of the air." This last use may afford a valuable hint to the constructors of covered seats, water-closets in the open air, summer-houses, or fishing-houses. In Spain, and also in Barbary according to Desfontaines, and in the Canary Isles according to Webb and Berthelot, it is used for making bee-hives. For this purpose, the bark of young trees is chosen, rolled into a cylinder, and made fast by sewing, or by hoops. There are various other uses to which the bark of the cork tree is applied in its organic state; and it is burned in close vessels, to make the powder which is sold in the colour-shops under the name of Spanish black. At the celebrated Cork Convent at Cintra, several articles of furniture are made of this tree, which strangers who visit the convent are requested to lift, in order that surprise may be excited at their extraordinary lightness. The most valuable property of the cork, and that which is almost peculiar to it, is its imperviousness to any common liquid; while, at the same time, it is light and porous, and, consequently, one of the best non-conductors of heat. Add to these properties its compressibility and elasticity, and we have a substance which can scarcely be equalled either in nature or by art. Its non-conducting properties, flexibility, and elasticity render it suitable for lining articles of dress, or the walls or floors of rooms; its lightness, and its imperviousness to fluids, fit it in a superior manner for life-preservers, either in the form of boats, or articles to be attached to the body; and its compressibility, joined to its elasticity, taken in connexion with its imperviousness to liquids and its great durability, render it the best of all known substances for forming stoppers to bottles. For this latter purpose, as Bosc observes, it forms an article of commerce throughout the civilised world. There is nothing peculiar in the culture of the cork tree, except that young trees should be pruned, so as to have a clear stem of 10 ft. or 12 ft. in height, on which the cork is to be afterwards produced.

Mode of detaching and preparing the Cork. It is observed by authors, that the bark of the cork tree which separates from it naturally is of little value compared with that which is removed by art; and the reason, doubtless, is, that in the latter case it has not arrived at that rigid, contracted, and fractured state, which is the natural consequence of its dropping from the tree. When the cork tree has attained the age of about 15 years, according to Du Hamel, or of about 20, according to Bosc, the bark is removed for the first time; but this first bark is found to be cracked, and full of cells and woody portions, and is therefore only fit for burning, or being employed in tanning. The bark is separated by first making a circular cut round the trunk, imme-

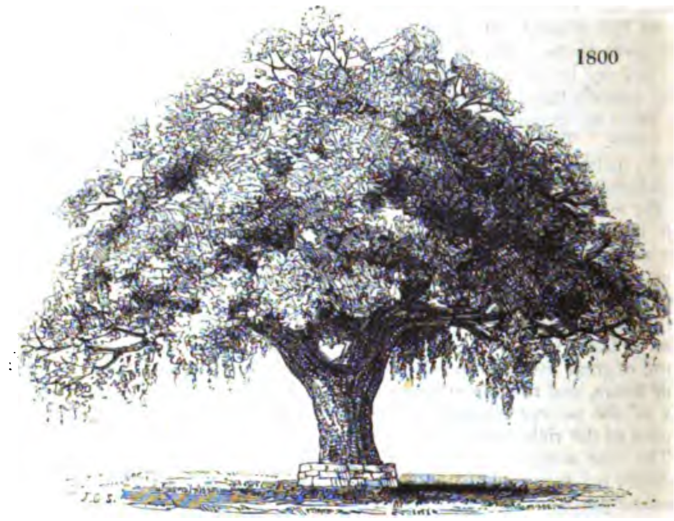
diately under the main branches, and another at a few inches above the surface of the ground. The portion of bark intervening between the two cuts is then split down in three or four places; care being taken, both in making the circular cuts, and also the longitudinal ones, not to penetrate the inner bark. This operation is commonly performed in July, or in the beginning of August, when the second sap flows plentifully. The tree is now left for 8 or 10 years, when it is again disbarked as before; but the bark has not even now attained the desired perfection for the manufacture of corks; and, therefore, it is sold to the fishermen for their nets, and for different other inferior uses. At the end of 8 or 10 years more, a third disbarking takes place, when the cork is found to have the requisite thickness and quality. From this time, while the tree exists, which, according to Bosc, may be two or three centuries, and, according to Du Hamel and Poiret, 150 years or more, its disbarking takes place regularly every 8, 9, or 10 years; the quality of the bark improving with the increasing age of the tree, which is not in the slightest degree injured by its removal. (*Nouv. Du Hamel*, vii. p. 188.; and *Poiret's Hist. Phil. des Plantes*, vii. p. 419.) The instrument by which the bark is cut and separated from the tree is a sort of axe (*fig.* 1799.), the handle of which is flattened into a wedge-like shape at the extremity; and this serves to raise the bark after it has been cut: in short, the instrument is not unlike that used in Britain for taking the bark off the common oak. The cork, when first removed from the tree, is in laminæ, more or less curved, according to their breadth, and the diameter of the tree from which they have been taken. To make them lose this curved form, after being scraped on the outer surface to remove the coarser parts of the epidermis, and any epiphytes or other extraneous substances, they are held over a blazing fire till the surface becomes scorched; after which they are laid flat on the ground, and kept in that position for some time by large stones. This gives them a set, or form, which they retain ever afterwards; and thus they become in a fitter state, not only for packing and transportation, but for being manufactured. The slight charring which the scorching produces has the effect of closing the pores of the cork, and giving it what the cork-cutters call nerve. The best cork is not less than 1½ in. in thickness: it is supple, elastic, neither woody nor porous, and of a reddish colour. Yellow cork is considered of inferior quality; and white cork, which has not been charred on the surface, as the worst. The duty on manufactured cork, M'Culloch tells us, is prohibitory; and on the raw material it is no less than 8*l.* a ton. The average annual importation is from 40,000 cwt. to 45,000 cwt.; and the price, including duty, is from 20*l.* to 70*l.* per ton. It is imported from the south of France, Italy, and Barbary, as well as Spain; but Spanish cork is the best, and fetches the highest prices. If the cork which is removed from trees at the first and second disbarkings were admitted duty free, it would be found of great use in lining the walls and roofs of cottages, and for covering their floors, and various other uses, which would contribute much to the comfort of the poorer classes, independently of lining the summer and fishing houses of the rich, as already suggested.


1799

The tree attains as large a size in Britain as it does in Spain, and might probably produce cork for the above purposes, if it were fairly tried, in the warmest parts of England. Michaux strongly recommends its introduction into the United States, observing that it could not fail to thrive wherever *Q.* vìrens exists; as, for example, on the southern coast, and its adjacent islands. Captain S. E. Cook laments the destruction of the cork trees in Spain, as Bosc does their neglect in France. A contract, Captain Cook observes (writing in 1834), has lately been made for the extraction of a quantity of the finest bark from the Sierra di Morena, in the neighbourhood of Seville; and the contractors were compelled to take the inner bark as well as the outer, the stripping off of which is known to kill the tree. The inner bark, being of no use but for tanning, was found an incumbrance to the con-

tractors, who had no demand for it. Thus the government, for a temporary gain, occasioned a national loss of a prodigious number of valuable trees. (*Sketches*, &c., vol. ii. p. 248.) The oldest cork tree in the neighbourhood of London is in the grounds of the Fulham Palace; one of the handsomest, though a much smaller tree, is that in the Fulham Nursery, of which the engraving in our last Volume is a portrait. In the garden of the London Horticultural Society, the rate of growth may be stated as 6 ft. or 8 ft. in 10 years; but, with extraordinary preparation, it would grow with double that rapidity. The largest cork tree in Britain (perhaps in the world) is one in Devonshire, at Mamhead, about 8 miles from Exeter. In 1834, the circumference of the trunk of this tree, at 1 ft. from the ground, was 12 ft. 6 in. The height of the trunk, before it branched off, was 10 ft., and the total height of the tree about 60 ft. It stands in the middle of the park, quite detached and exposed, at an elevation of about 450 ft. above the level of the sea, in a soil of fine rich red loam, on a substratum of red stone conglomerate. It is only 3 miles distant from the sea, and is exposed to the sea breeze from the east. The head is oval and compact, and its grand massive branches, each of which would form a tree of noble dimensions, are covered with rugged corky bark, resembling richly chased frosted silver, which is finely contrasted with the dark green luxuriant foliage. Near this tree stands another, 50 ft. high, with a trunk 11 ft. 3 in. in circumference. (*Gard. Mag.*, vol. xi. p. 127.)

In Ireland, in the neighbourhood of Cork, on the estate of Sammerstown there is a cork tree of unknown age, and which is thought by some to have stood there for several centuries. Several generations ago, it must have been a remarkable tree, for the then proprietor, when letting the land on which the tree stands, introduced a clause into the lease, by which the tenant incurred a penalty of 20*l.*, if he cut down or injured the tree. *Fig.* 1800. is a portrait



1800

of this tree, to the scale of 1 in. to 10 ft., which was sent to the *Magazine of Natural History* in 1828; and the following are the dimensions of the trunk and principal branches: — Girt of the trunk at 3 ft. from the ground, 8 ft. 10 in.; height of the trunk before it divides, 9 feet; girt of each of the two principal branches, 6 ft. 10 in.; girt of the second-rate branches, 5 ft. 4 in.; diameter of the head, 36 ft.; the thickness of the cork, or outer bark, on the trunk, is about 3 in. The height of this tree was not sent to us; but, judging from the drawing, it appears to be between 25 ft. and 30 ft.

Poetical Allusions. There are very few. Lord Byron speaks of

"The cork trees hoar that crown the shaggy steep,"

in his *Childe Harold;* and Southey describes their appearance in the gleam of a traveller's fire, in his *Roderick, the Last of the Goths:*—

"Bright rose the flame replenish'd: it illumed
The cork tree's furrow'd rind, its rifts and swells,
And redder scars, and, where its aged boughs
O'erbower'd the travellers, cast upon the leaves
A floating, grey, unrealising gloom."

Statistics. In the environs of London, at Ham House, Essex, the cork tree is 27 ft. high, the diameter of the trunk 1 ft. 10 in., and of the head 23 ft.; at Kenwood, Hampstead, 60 years planted, it is 35 ft. high, the diameter of the trunk 2 ft., and of the head 40 ft.; at Fulham Palace, 150 years old, it is 40 ft. high, the diameter of the trunk 3 ft. 6 in., and of the head 24 ft.; in the Mile End Nursery, it is 28 ft. high, the circumference of the trunk 4 ft. 4 in.—South of London. In Devonshire, at Killerton, 34 years planted, it is 57 ft. high, the diameter of the trunk 2 ft., and of the head 41 ft.; at Brochill, 45 ft. high, the diameter of the trunk 3 ft., and of the head 45 ft. In Somersetshire, at Nettlecombe, 60 years planted, it is 30 ft. high, the diameter of the trunk 1 ft. 10 in., and that of the head 28 ft. In Suffolk, at Campsey Ash, it was 26 ft. high, with a trunk 2 ft. 3 in. in diameter. This tree, we are informed, is since dead. In Surrey, at Farnham Castle, 50 years planted, it is 30 ft. high; at Claremont, it is 40 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 50 ft.—North of London. In Cheshire, at Eaton Hall, 8 years planted, it is 10 ft. high. In Denbighshire, at Llanbede Hall, 15 years planted, it is 22 ft. high. In Pembrokeshire, at Stackpole Court, 100 years old, it is 40 ft. high, the diameter of the trunk 2 ft., and of the head 40 ft. In Suffolk, at Finborough Hall, 16 years planted, it is 12 ft. high; the diameter of the trunk 8 in., and of the head 10 ft. In Warwickshire, at Coombe Abbey, 60 years planted, it is 64 ft. high, the diameter of the trunk 2 ft. 8 in., and of the head 20 ft. In Worcestershire, at Croome, 40 years planted, it is 35 ft. high, the diameter of the trunk 10 in., and of the head 15 ft.—In Ireland, in the Glasnevin Botanic Garden, 30 years planted, it is 15 ft. high, the diameter of the trunk 10 in., and of the head 12 ft.; at Cypress Grove, it is 45 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 27 ft.; at Castletown, it is 28 ft. high, the diameter of the trunk 2 ft. 8 in., and of the head 24 ft. —In Switzerland, at the seat of M. Gaussen, Bourdigny, near Geneva, it is 3 ft. 4 in. in circumference. —In Italy, in Lombardy, at Monza, 14 years planted, it is 12 ft. high, the circumference of the trunk 1 ft., and the diameter of the head 10 ft.

♀ 35. Q. PSEU'DO-SU'BER *Desf.* The False-Cork Oak.

Identification. Desf. Atlan., 2. p. 348.; Spreng. Antiq. Bot., p. 16. t. 1.; N. Du Ham., 7. p. 174.; Willd., No. 60.; Smith in Rees's Cycl., No. 67.

Synonymes. Chêne faux Liège, Chêne de Gibraltar, *Fr.*; Unächte Kork-Eiche, *Ger.* Bosc states that he possesses a leaf of *Q. Túrneri*, which was brought to him from Kew by L'Héritier, and that it is identical with *Q.* Pseùdo-Sùber; but the leaves of *Q.* Túrneri are not in the slightest degree hoary or glaucous beneath, nor has it a corky bark.

Engravings. Sant. Viagg., t. 4.; Spreng. Antiq. Bot., t. 1.; N. Du Ham., 7. t. 48. f. 2.; and our *fig.* 1801.

Spec. Char., &c. Leaves ovate-oblong or lanceolate, sinuated, dentated or serrated; hoary beneath. Bark fungous, cracked. Nut ovate. Calyx muricated, with lax, recurved, linear scales. (*Desf.*) Native of the mountains of Tuscany, Spain, and Barbary. Desfontaines gathered it on Mount Atlas, and the Abbé Durand, near Tangier. A tree, 50 ft. or 60 ft. high; the bark of which is corky, though less so than that of *Q.* Sùber. Young branches downy or hoary; sometimes smooth, striated. Desfontaines describes the bark as fungous as very thick, and as being, without doubt, capable of replacing the cork of Europe. The leaves are oval-oblong, dentated or serrated; smooth above, and pubescent beneath. He adds that the leaves do not drop during winter; while in the *Nouveau Du Hamel*, in *Bosc*, and under the article *Q.* Pseùdo-Sùber in *Rees's Cyclopædia*, they are described as deciduous. Bosc, indeed, states that the leaves remain green a part of the winter; so that the tree may be considered as forming the connecting link between the evergreen oaks and the deciduous ones. A tree of *Q.* Pseùdo-Sùber was planted in the garden of M. Lemonnier, near Versailles, by M. A. Richard, in 1754, which is stated to have proved quite hardy, and of vigorous growth, though, in 1820, it had not produced fruit. We have not been able to get any account of the present state of this tree; but we can easily conceive that it may be evergreen on the shores of the Mediterranean, and only subevergreen in the neighbourhood of Paris or London. The specimens of this tree in the Horticultural Society's Garden (lately, 1837, dead), and at Messrs. Loddiges's, have always appeared to us



1801

to be closely allied to *Q.* Túrneri: but, the leaves of the former will always be found to be somewhat downy beneath; while those of *Q.* Túrneri are perfectly smooth, and of the same colour on both sides. Neither sort appears to show the least indication, at present, of corkiness in the bark; though trees of *Q.* *S*ùber in both places, standing near them, have the bark decidedly corky. Unless, therefore, we could see the tree at Versailles, we cannot decide whether the plant in British gardens is that discovered by Desfontaines, or not. If it is, it certainly appears much more nearly allied to the group *C*érris than to that of *I*'lex. The tree in Loddiges's arboretum is 7 ft. high, and, in February, 1837, had lost every leaf; as had, with the exception of a very few, that in the Horticultural Society's Garden, in 1835, when it was of about the same age and size. After all, we think it extremely probable, that the tree at Muswell Hill is the *Q.* Pseùdo-*S*ùber of Desfontaines; but as we have not seen the acorns, either of that tree, or of the *Q.* Pseùdo-*S*ùber in the Horticultural Society's Garden, or at Messrs. Loddiges's, we should not consider ourselves justified in deciding on the point. We may possibly be able to do so in our Supplement.

b. *Natives of North America.*

§ ix. *Virëntes.* *Live Oaks.*

Sect. Char. Leaves oblong-lanceolate; dentate, and variously cut when young; but, on full-grown trees, quite entire. Bark smooth, black. Fructification biennial. Cup imbricate. Nut long. Low trees, or shrubs; rather tender in Britain, and not attaining a timber-like size north of London.

♀ 36. *Q.* VI'RENS *Ait.* The green, *or Live*, Oak.

Identification. Ait. Hort. Kew., ed. 1., 3. p. 356., ed. 2., 5. p. 287.; N. Du Ham. 7. p. 151.; Willd. Sp. Pl., 4. p. 425.; Pursh Fl. Amer. Sept., p. 626.; Michx. Quer., No. 6.; Smith in Rees's Cycl., No. 5.

Synonymes. *Q. Phéllos β Lin. Sp. Pl.*, 1412.; *Q.* sempervirens *Banister* and *Walt. Car.*, 234.

Engravings. Michx. Quer., t. 10, 11.; N. Amer. Syl., 1. t. 12; our *figs.* 1802. and 1803; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves coriaceous, elliptic-oblong, revolute, entire, pointless; obtuse at the base; clothed with starry down beneath. Fruit stalked. Nut oblong. (*Willd.* and *Smith.*)

Description. The live oak is commonly 40 ft. or 45 ft. high, with a trunk from 1 ft. to 2 ft. in diameter; but it is sometimes much larger; and a hollow tree of it was felled at Charleston, which had a trunk 24 ft. in circumference. "Like most other trees," says Michaux, "it has, when insulated, a wide and tufted summit. Its trunk is sometimes undivided for 18 ft. or 20 ft.; but it often ramifies at half this height, and, at a distance, has the appearance of an old apple or pear tree." (*N. Amer. Syl.*, i. p. 58.) The bark is blackish and hard. The wood is heavy, compact, fine-grained, and of a yellowish colour, which deepens as the tree advances in age. The number and closeness of the concentric circles evince the slowness of its growth, and the probability of its great duration, from the much larger proportion of fibrous than of cellular tissue in its composition. The leaves are oval, coriaceous, of a dark green above, and whitish beneath: they persist during several years, but are partially renewed every spring. On old trees, growing wild in the forests, they are always entire, as shown in *fig.* 1802.; but, on seedlings of 2 or 3 years old, they are very distinctly toothed, as in *fig.* 1803. On trees growing in cool soils, or reared in plantations, they are one half larger than those on the trees usually found in a



1802

wild state, and are often denticulated even on old trees. The acorns are of an elongated oval form, nearly black, and are contained in greyish pedunculated cups. The fruit is sometimes very abundant, and it germinates with such ease, that, if the weather is rainy at the season of its maturity, many acorns are found on the trees with the radicle unfolded. In British gardens, this tree is no where found higher than a large shrub, it requiring rather a warmer climate to attain a timber-like size. There is a tree at Kew, between 40 ft. and 50 ft. high; and a handsome small tree at the Duke of Devonshire's, and some in the Hackney arboretum. In the neighbourhood of Paris, the live oak and Q. aquática, Bosc informs us, are the only two American species that are found to be tender.


1803

Geography and History. The live oak is confined to the maritime parts of the southern states of North America, where it is known by the name of the live oak. Its most northern boundary is Norfolk, in Virginia. "From Norfolk it spreads along the coast for a distance of 1500 or 1800 miles, extending beyond the mouth of the Mississippi. The sea air seems essential to its existence; for it is rarely found in forests upon the mainland, and never more than 15 or 20 miles from the sea." (*Michx.*) It is most abundant, and of the best quality, on the shores of the bays and creeks of the southern states; and on the fertile islands, which lie in great numbers scattered along the coasts for several hundreds of miles. "I frequently saw it," says Michaux, "upon the beach, or half-buried in the movable sands upon the downs, where it had preserved its freshness and vigour, though exposed during a long lapse of time to the fury of the wintry tempest, and to the ardour of the summer's sun." (*N. Amer. Syl.*, i. p. 58.) The live oak was one of those discovered by Banister, and it was by him called Q. sempervìrens. Catesby, in his *Natural History of Carolina*, p. 17., describes it as a pyramidal tree, 40 ft. high, in the salt marshes of Carolina. He adds that the acorns are remarkably sweet, and were used by the Indians to thicken their venison soup, and for expressing an oil, which was very much like the oil of sweet almonds. The first record of this tree that we have in England is, that it was in cultivation by Miller in 1739; but it does not appear to have been much planted, as we have not received an account of any old trees of this species now existing in England. In America, there is said to be a very large live oak at Goose Creek, near Charleston, which measures 45 ft. in circumference close to the ground, and 18 ft. 6 in. at its smallest part: its largest limb is 12 ft. 6 in. in girt. A modern traveller, Mr. Stuart, in his *Three Years in North America*, published in 1833, thus speaks of the live oak, whilst describing his journey from Georgetown to Charleston: — "On this day's journey, I first saw, and in great numbers, the most valuable of the American trees, the Quércus vìrens, the most durable of oaks. It flourishes most on lands adjacent to salt water. It is almost as heavy as lignum vitæ (*Guaìacum* officinàle). Its trunk is generally not long; but its crooked branches frequently spread over more than a quarter of an acre of ground. The wood of this tree is almost incorruptible. It was on account of the abundance of this tree in Florida, fit for building ships of war, that the Americans showed the great anxiety, which was at last gratified in 1819, to add Florida to their extensive territories, and which has led the general government, since its acquirement, to lay out very large sums in the preservation and establishment of live oak plantations in Florida. Indeed, I have heard of the formation of plantations on a large scale

nowhere but in Florida." The object of the American government being to provide for the establishment and maintenance of a powerful navy, the cultivation of the live oak, which is almost the only oak they have suitable for ship timber, is an object of national importance.

Properties and Uses. According to Michaux, and all authors who have written on the oaks of America, the wood of the live oak is much stronger, and incomparably more durable, than that even of the white oak, and is more esteemed for ship-building than any other wood in the United States. "From its great durability, when perfectly seasoned, it is almost exclusively employed for the upper part of the frame. To compensate its excessive weight, it is joined to the red cedar (*Juníperus virginiàna*), which is extremely light, and equally lasting. The live oak does not afford large timber; but its wide and branching summit makes amends for this disadvantage, by furnishing a great number of knees." (*Michx.*) "The vessels built at New York and Philadelphia, with the upper frame of red cedar and live oak, and the lower timbers of white oak, are as durable as those constructed of the best materials in Europe." (*Id.*) The best trenails used formerly to be made of the wood of the live oak; but they are now made of locust wood, and of the heart wood of *Pinus palústris*. In the southern states, the live oak is used for the naves and felloes of heavy wheels, and for screws and the cogs of mill-wheels; for all which purposes it is far superior to the white oak. The bark is excellent for tanning; but it is so hard and thin, that it is seldom found in sufficient quantities. From the acorns, which, though not sweet, are eatable, Michaux says that the Indians still extract an oil which they use in cookery. A great many trees of this species were raised and sold by Cobbett; the acorn not losing its vitality during the voyage from America to Europe; but we never hear of the trees attaining any size; and, as we have already observed, the climate is against them. As a low evergreen tree or large shrub, the live oak well deserves a place in collections, forming an interesting bush, as shown in the portrait, given in our last Volume, of the tree at the Duke of Devonshire's villa at Chiswick. In France, near Nantes, 80 years planted, it is 40 ft. high; the diameter of the trunk being 4 ft. In Lombardy, at Monza, 20 years from the acorn, it is 20 ft. high; diameter of the trunk 5 in., and of the head 14 ft. Abundance of young plants and of acorns may be had from Mr. Charlwood, at 10*s*. per hundred, or 5*s*. per bushel. At Bollwyller, plants are 5 francs per dozen; and at New York, where, according to Prince's *Catalogue*, it requires protection during winter (a fact that speaks volumes against its ever becoming a profitable timber tree in this country), plants are 50 cents each.

? ♀ 37. Q. MYRTIFO'LIA *Willd.* The Myrtle-leaved Oak.

Identification. Willd., No. 4.; Pursh, No. 4.; N. Du Ham., 7. p. 151.; Rees's Cycl., No. 4.

Spec. Char., &c. Leaves coriaceous, oblong, entire, smooth; acute at each end. A native of Carolina, according to Willdenow, who alone has noticed this species. Pursh has admitted it into his work. The branches are round and brown; the leaves 1 in. or more in length, coriaceous, evergreen, oblong, somewhat acute at the base; entire and slightly revolute at the margin; shiny above; opaque, but smooth, beneath; on short footstalks. The form of the leaves is much like those of the common broad-leaved myrtle. The flowers and fruit are unknown. (*Willd.*, as quoted in *Rees's Cycl.*)

c. *Natives of Nepal.*

§ x. *Lanàtæ. Woolly or downy-leaved Oaks.*

Sect. Char. Leaves oval-oblong or lanceolate, serrated or dentated, but not sinuated or lobed; woolly beneath. Trees, natives of Nepal; and only half-hardy in the climate of London. They may be propagated by cuttings, which root without much difficulty; and the plants require the protection of a wall.

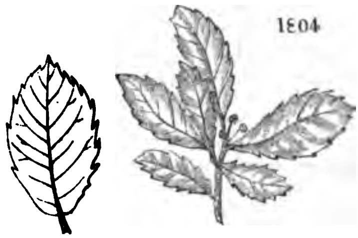
♀ 38. Q. LANA'TA *Smith.* The woolly-*leaved Nepal* Oak.

Identification. Rees's Cycl., No. 27.

Synonymes. Q. lanuginòsa *D. Don Prod. Fl. Nep.*, p. 57., and *Lodd. Cat.*, ed. 1836; Q. *Bánja* Ham. MSS.; ? Q. oblongàta *D. Don*, l. c.; ? Q. incàna *Royle Illust.*, p. 341.

Engraving. Our *fig.* 1804., from the tree at Kew.

Spec. Char., *&c.* Leaves elliptic-oblong, sharply serrated, coriaceous; densely woolly beneath. Fruit in axillary solitary spikes. Calyx scaly, without prickles. (*Smith.*) "Native of the mountains of Upper Nepal; flowering in April. (*Buchanan.*) The Parbutties call it *Banza*, or *Banja;* the Nawars, *Soshi stringali.* This is a tree of vast dimensions, with a scaly bark, and rigid, brown, warty branches, clothed, when young, with dense white down. Leaves alternate, somewhat 2-ranked, stalked, elliptic-oblong; sometimes rather obovate, pointed; from 3 in. to 5 in. in length, and 2 in. or more in breadth; strongly and sharply serrated, except at the very base,


1804

which is more or less rounded, and occasionally unequal; the upper surface green, shining, and naked (except when young), but not quite smooth to the touch; the under clothed with fine, dense, uniform, brownish, woolly pubescence, and marked with prominent, parallel, but not very crowded, obliquely transverse veins. Footstalks stout, downy, scarcely 1 in. long. Stipules ovate, membranous, deciduous. Male flowers in short, dense, hairy spikes, at the base of the young shoots, as they protrude from the bud. Calyx with 5 or 6 teeth. Anthers about 6, sessile. Female flowers, as far as Dr. Buchanan could observe, on a separate tree, in very short, solitary, axillary spikes. Acorns either solitary, or several crowded together; small, ovate, hairy, half-covered by their scaly unarmed cups." (*Smith* in *Rees's Cycl.*) Professor Don, in his *Prodromus Floræ Nepalensis*, had described Q. lanuginòsa and Q. oblongàta as two species; but he has since informed us that the specimen which he had of Q. oblongàta being very imperfect, he is now disposed to refer it to Q. lanàta. Dr. Royle, in his *Illustrations of the Botany, &c., of the Himalayas*, observes that the lofty summits of these mountains are covered with snow until May and June. "The snow not melting until the sun has reached its most northern limit, the increase of temperature is great and sudden, and the vegetation proportionably rapid." (p. 20.) "In ascending the Choor Mountain, on the 9th of May, at first the ordinary Himalayan trees, such as Rhododéndron arbòreum and Quércus lanàta, were met with; the pines then made their appearance. Every thing looked like the revival of spring: some of the trees and shrubs were putting forth new leaves, and others were in full flower. Higher up, patches of snow were seen; and beyond this every thing had a wintry aspect: the snow lay in masses, though detached, having melted away from round the trunks of many trees and the blocks of gneiss rock. At first, the Coníferæ and other trees were intermixed with oaks; but, latterly, the oak grew alone. Q. semicarpifòlia formed the forest. On emerging from this, there is only a short ascent to the peak." (p. 21.) Q. lanàta was introduced about 1818, and was first planted at Kew. There are now (1837) plants of it 10 ft. high against the walls in the Horticultural Society's Garden, and in front of one of the stoves at Kew, which produce acorns. In the arboretum of Messrs. Loddiges, and in that at Flitwick, plants of this species have stood out, without any protection, in the open garden for several years; but they are annually killed down within a short distance of the ground. There are small plants in pots, at Messrs. Loddiges's, which bear acorns.

♀ 39. Q. ANNULA'TA *Smith*. The ring-*cupped* Oak.

Identification. Smith in Rees's Cycl., No. 22.
Synonymes. Q. *Phullàta* Ham. MSS., D. Don Prod. Fl. Nep., p. 57.; ? Q. Kamroòpii D. Don, l. c.; Q. glaúca *Lodd. Cat.*, ed. 1836; ? Q. glaúca *Thunb.*; ? Q. acuminàta *Hort.*
Engraving. Our *fig.* 1805.

Spec. Char., *&c.* Leaves ovate-lanceolate, pointed; dentately-serrated, except towards the base; somewhat glaucous and downy beneath. Fruit spiked.



1805

Nut oblong. Calyx furrowed concentrically. (*Smith* and *Don.*) "Gathered by Dr. Buchanan (who afterwards took the name of Hamilton), at various places in Upper Nepal, bearing fruit, in December, 1802. A very large tree, whose wood is excellent. The branches, 2 or 3 together, smooth. Leaves evergreen, rigid, exactly like those of Q. glaúca *Thunb.*, but somewhat silky beneath, and less glaucous; the young ones very silky. Stipules linear, hairy, longer than the footstalks, deciduous. Male flowers in pendulous, hairy, yellowish, shortish spikes, springing from the buds below the leaves, whose scales are imbricated in 5 rows. Female, from 3 to 6, in solitary, axillary, upright, stalked, smooth spikes, about the length of the footstalks. Calyx of the female flowers globose, smaller than hempseed; composed of several concentric imbricated layers, of which the outermost is smooth and notched, the rest downy and entire. Germen globose. Style very short and thick. Stigmas 3, obtuse. Acorns quite sessile on the common flower stalk. Cup rather smaller than that of our British oaks; entire and even at the edge; composed of 7 or 8 concentric, annular, imbricated, crenate scales, externally silky. Nut ovate, acute, smooth, and even, twice as long as the cup. The Parbutties call this tree *Phullaat;* the Nawars, *Gushi*, or *Paca stringali.* We find great reason to think it may be, as Dr. Buchanan suspected, the same species with Thunberg's Q. glaúca. The leaves of his specimen show a slight degree of pubescence about the veins, but have not the minute silkiness of ours." (*Smith* in *Rees's Cyclopædia.*) Professor Don has given us the same information respecting Q. Kamroòpii (which he is now disposed to refer to Q. annulàta) as he did respecting the referring of Q. oblongàta to Q. lanàta. In both cases, his specimens were imperfect. He had named Q. Kamroòpii in honour of "Kamroop, or, more properly, Kamrup, a Brahmin, and a zealous collector for Dr. Wallich in Gurwhal, or Garnwhal, a country situated to the north-west of Nepal." There are plants of this species 10 ft. high, against a wall in the Horticultural Society's Gardens, and also in the front of a stove at Kew; and, under the name of Q. glaúca, at Messrs. Loddiges's. Mr. Smith of Kew informs us that it is decidedly hardier than Q. lanàta.

App. i. *Oaks in British Gardens, not referable, with certainty, to any of the above Sections.*

♀ 40. Q. Tu'rneri Willd. Turner's Oak.

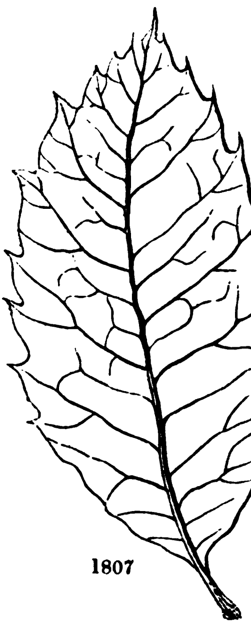
Identification. Willd. Enum., 975.; Baumz., p. 339.
Synonymes. Q. hybrida *Hort.*; Chène de Turner, *Fr.*; Turnersche Eiche, *Ger.*
Engravings. Willd. Baumz., t. 3. f. 2.; and our *fig.* 1806., from a specimen taken from the tree in the Horticultural Society's Garden.

Spec. Char., &c. Leaves oblong, mucronate, dentate; glabrous on both sides; somewhat wedge-shaped at the base. Branchlets hairy. (*Willd.*) A tree, growing to the height of 40 ft. or 50 ft. in 40 years, and retaining its foliage till April or May, like the new Lucombe oaks. It is stated in Willdenow's *Baumzucht* to be a native of Thibet; but we have ascertained from Messrs. Loddiges that it is a hybrid, which was raised about 1795, or before, by Mr. Spencer Turner, in the Holloway Down Nursery, Essex, which was founded by him about 1787, and which now no longer exists; and that the plant at Berlin, which is kept in the conservatory there, was sent to Will-

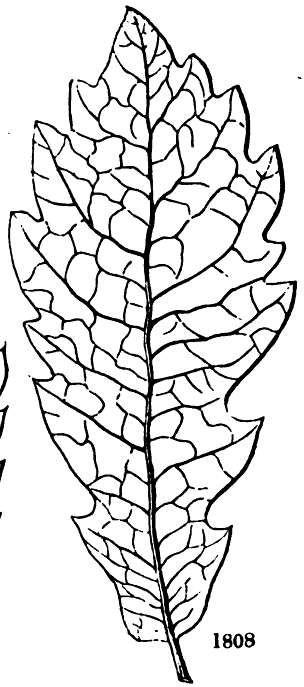
1806



denow by the late Mr. Conrad Loddiges, under the name of *Q.* Túrneri. It appears to be a hybrid between *Q.* pedunculàta and *Q.* I'lex; and, indeed, the leaves of some varieties of I'lex, such as *fig.* 1807., which is from a plant in Messrs. Loddiges's collection, have exactly the same bluish green colour as those of *Q.* Túrneri, and are nearly equal to those of that species in length, as is shown by *fig.* 1808., which is from the tree at Messrs. Loddiges; both figures being of the natural size. The leaves vary considerably in size (see *fig.* 1809., to our usual scale), but not much in form, or in the character of their margins. Mr. Rivers, jun., of Sawbridgeworth, whose father recollects the tree being originated by Mr. Turner, and who has propagated it extensively, says, "It takes readily by grafting on the common oak, from which, in summer, it can scarcely be distinguished, as its branches and leaves are so similar; but, in winter, its thick, glossy, and strictly evergreen foliage has a fine effect." On the whole, it is an exceed-



1807



1808

ingly distinct and very handsome species, by no means liable to vary in the form of its foliage, like what may be called the natural species of European and American oaks. It is rather more tender than *Q.* Cérris Lucombeàna, but, nevertheless, it retains its foliage nearly as long as that species; and, as it appears from a tree of each, of the same age and size, and planted at the same time, perhaps thirty years ago, in the Hammersmith Nursery, it grows with nearly equal rapidity. At the same time, it is right to state that Mr. Rivers, jun., considers it rather slow-growing; a tree in the Sawbridge-

worth Nursery, which has been 40 years planted, being only from 22 ft. to 25 ft. high, with a trunk 1 ft. 8 in. in circumference at 5 ft. from the ground. Two trees in the Hammersmith Nursery, about the same age, are rather higher. Trees in nurseries, however, are seldom fair specimens, as they are kept there for the purpose of supplying scions for budding or grafting. The tree in the Horticultural Society's Garden has attained the height of 12 ft. in 10 years; and one at Ham House was, in 1834, 42 ft. high; the diameter of the trunk 1 ft. 6 in., and of the head 18 ft. Neither this tree nor that in the Sawbridgeworth Nursery, nor any other that we have heard of, has yet flowered.

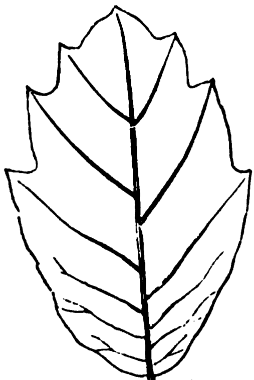


1809

¶ 41. *Q.* HY'BRIDA NA'NA. The dwarf hybrid Oak.

Synonymes. *Q.* hýbrida *Lodd. Cat.*, 1836; *Q.* "a hybrid between *Q.* pedunculàta and *Q.* I'lex, in the Horticultural Society's Garden;" *Q.* hùmilis *Hort.*; *Q.* nàna *Hort.*
Engravings. Our *figs.* 1810. and 1811.

Spec. Char., &c. Leaves ovate or oblong, obtusely dentate, smooth, and of the same colour on both sides. Footstalks short. Found about 1825, in a bed of seedling oaks in the Bristol Nursery, where the original plant, in May, 1837, was between 8 ft. and 9 ft. high, with a trunk 8 in. in circumference at 1 ft. from the ground. Propagated by grafting on the common oak. It is a



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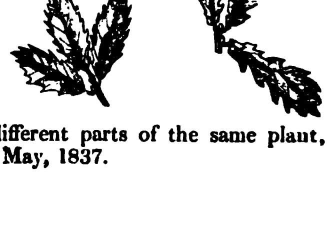
1810



1811

decidedly subevergreen bush, and not a tree; whence has arisen the popular name of hùmilis. In summer, the leaves, at a distance, bear a considerable resemblance to those of the common oak; but, on a nearer inspection, they appear as in *fig.* 1811. or in *fig.* 1810.: the first from the specimen tree in the Hackney arboretum, and the second from the arboretum at Milford. Towards the autumn, those shoots which have continued growing, exhibit leaves on their extremities so exactly like those of *Q.* Túrneri, that it is altogether impossible to make any distinction between them This is so very strikingly the case at Messrs. Loddiges's, that, if it were not from the totally different habit of *Q.* Túrneri and *Q.* hýbrida nàna, we should, from the appearance of the leaves, which remain on, in both species, at the points of the shoots, after all the others have dropped off, consider them to be the same species. *Fig.* 1812. exhibits leaves taken from the extremities of the shoots, in different parts of the same plant, in the Horticultural Society's Garden, in May, 1837.

1812



♀ 42. *Q.* FONTANE'S*II* Guss. Desfontaine's Oak.

Identification. A dried specimen, named by Gusson himself, in Dr. Lindley's herbarium.
Synonyme. *Q.* pseùdo-coccífera of Catros of Bordeaux, and of the Hort. Soc. Garden, in May 2837.
Engraving. Our *fig.* 1813.

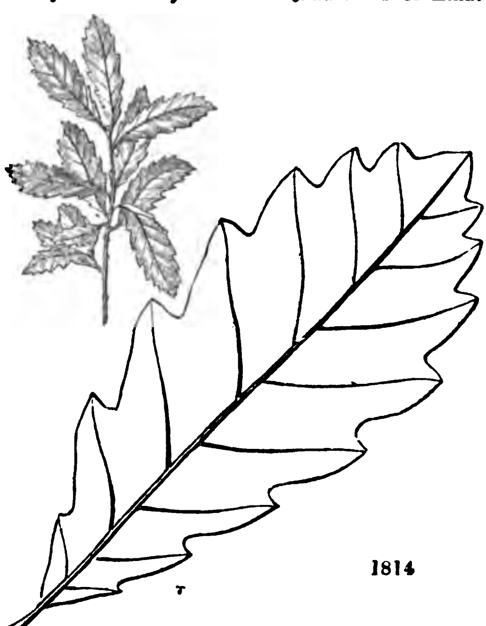
Spec. Char., &c. Leaves oval; obtusely sinuated, and bluntly dentate; downy beneath. Fruit on peduncles. This oak was received from M. Catros of Bordeaux, under the name of *Q.* pseùdo-coccífera, but it does not at all agree with the description given of that species in the *Nouveau Du Hamel*, where it is said to be evergreen, with leaves resembling those of *Q.* coccífera; while the plant in the Horticultural Society's Garden is deciduous. Dr. Lindley informs us that it is the *Q.* Fontanèsii of Gussone; a native of Calabria, and also found in Palestine; it being identical with a specimen in the doctor's herbarium, named by Gussone himself. Gussone considers it as identical with the *Q.* Pseùdo-*Sùber* of Desfontaines; which is somewhat singular, as Desfontaines describes his plant as an evergreen. The tree in the Horticultural Society's Garden is 12 ft. high, and the bark and buds are like those of *Q.* *C*érris.



1813

♀ 43. *Q.* ? AUSTRA'LIS *Link.* The Southern Oak.

Description. "A noble species of oak," Captain S. E. Cook observes, "is associated with the *Q.* *S*ùber in the neighbourhood of Gibraltar; where I met with it in ascending through a forest to the left of the common route to Cadiz, above Los Barrios. This species," he continues, "which is one of the finest of European trees, and which has not found its way into our nurseries, was pronounced by Dr. Lindley to be the *Q.* austràlis of Link. The leaf is very large, and ovate [Captain Cook, who has seen this account of his oak since it was in type, says it should be "obovate"], with small indentures. The acorns might be easily procured, in October or the beginning of November, from Gibraltar." (*Sketches*, &c., vol. ii. p. 249.) The acorns were so procured for the London Horticultural Society, through the influence of government, and plants were raised from them, in 1835, in the garden of the Society. *Fig.* 1814. is a representation of part of one of these plants of 2 years' growth, taken in March, 1837. The species appears to be a decided evergreen; and we think it is allied to *Q.* sessiliflòra. The *Q.* austràlis of Link, as quoted by Sprengel, *Syst. Veg. Quer.*, No. 59., which is the *Q.* hýbrida of Brotero, is thus described: — Leaves ovate-elliptic, somewhat obtuse, sinuated, toothed, coriaceous; shining above, pubescent beneath. Fruit almost sessile. Scales of the cup



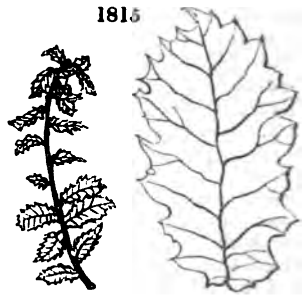
1814

closely adpressed. (*Spreng.*) "A tall tree, a native of Portugal, in the south of Beira, and on the hills near Coimbra; flowering in May. It appears to be a hybrid between Q. Ròbur and Q. pubéscens. It is not found in any of the mountainous parts of the north of Portugal; but there it is probably changed to Q. Ròbur." (*Brotero's Fl. Lus.*, ii. p. 31.) The Q. austràlis of the Horticultural Society's Garden has the leaves glaucous beneath. Whatever species this oak may turn out to be, it promises to be a very handsome evergreen, as hardy as Q. *I'*lex; and we hope it will soon be generally introduced into collections.

♀ 44. Q. Coo'kii. Captain Cook's Oak.

Description. Leaves evergreen; oval or lanceolate-elliptic; dentate, with recurved teeth; sessile, and green and glabrous on both sides. (See *fig.* 1815.) Among the acorns procured by the Horticultural Society from Gibraltar appear to be some of a species different from Q. austràlis; or, possibly, it may be only a variety of Q. gramúntia. As there are only two-years' seedling plants in the country, very little can be said about it; but we have ventured to apply to it the specific name above given, in honour of Captain S. E. Cook of Carlton, near Darlington, who was the means of its introduction, who is an enthusiastic arboriculturist, and who has kindly and liberally supplied us with valuable information respecting Quércus, *P*ìnus and other genera.

1815



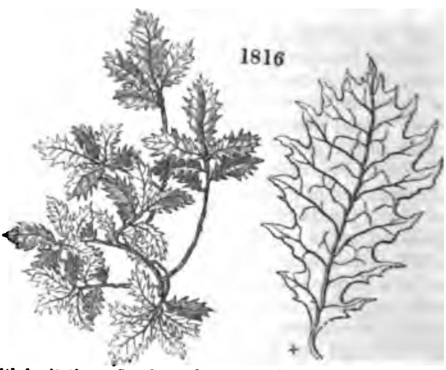
♀ 45. Q. falkenbergensis *Booth.* The Falkenberg Oak.

Description. Allied to the section Ròbur, but with leaves short, and serrated like those of Q. Cérris. Fruit small and roundish, and reproducing plants with the same characters as the parent. Discovered about 1832, on the Falkenberg in Hanover, near Hamburgh, and introduced into England by the Duke of Bedford in 1837. (*Booth*, in letter; and Forbes's *Hort. Tour.*, p. 5.)

App. ii. *European Kinds of Oaks not yet introduced.*

Q. *faginea* Lam.; Q. *ægilopifòlia* *Dict.*, 1. p. 725., *Willd.*, No. 68., *N. Du Ham.*, 7. p. 179., *Rees's Cycl.* No. 76.; Phéllodrys álba angustifòlia, &c., *Dalech. Hist.*, 25.; and our *fig.* 1816., from the specimen in the Linnæan herbarium. Leaves on short downy footstalks, obovate, with numerous uniform shallow lobes; downy beneath; somewhat heart-shaped and unequal at the base. Fruit sessile. (*Smith.*) Native of Spain and the south of France. Leaves small, 1¼ in. long, deciduous, obovate, very slightly sinuated, or, more properly speaking, coarsely toothed; the lobes being very short, equal, and obtuse; the upper side polished and smooth; the under white and downy. Footstalks downy. Fruit sessile. (*Willd.*) In the Linnæan herbarium are specimens gathered by Baron Alstrœmer in Spain, which answer extremely well to the above description, and not amiss to the figure of Dalechamp, which Lamarck cites with hesitation. In these, however, the lobes, or teeth, are acute, and the upper surface covered with minute starry hairs. There are also long, linear, recurved, ramentaceous stipules, that are soon deciduous. We do not scruple to consider this Lamarck's plant at least, and probably Willdenow's. (*Smith* in *Rees's Cycl.*)

1816



Q. *ægilopifòlia* Pers. Syn. 2, p. 570.; N. Du Ham., 7. p. 174.; Q. hispánica β. *Lam. Dict. Ency.*, 1. p. 723.; Chêne à Feuilles d'Egilops, *Bosc*; has oval, sinuated, and dentated leaves, the teeth of

which are close together and almost obtuse; green above, and downy beneath. The acorns are pedunculated, and half-enclosed in a smooth cup. The bark is cracked, but not corky. It is a native of Spain; and, according to Bosc, there is a plant at Trianon, raised from seed brought from Gibraltar by M. Richard in 1754.

Q. Bróssa *Bosc Mém. sur les Chênes*, p. 319.; Chêne Brosse at *Nantes*; Chêne nain *Bonami*; bears so great an analogy to *Q.* pyrenàica (see p. 1842.), that, according to Bosc, it may possibly be only a variety of that species: the leaves are, however, smaller and less velvety; the divisions are larger, wider apart, and more obtuse; and the margins are less frequently denticulated. The leaves are cordiform, and slightly unequal at the base. The acorns (which Bosc had only seen when young) are borne five or six together on a long peduncle: the scales of their cups are broad and long. Bosc found this oak in great abundance between Périgueux and Bordeaux. De Candolle found it near Mons, Angers, and Nantes, where it was known by the name of Chêne Brosse. It grows in the most arid soil, where it is a low shrub, and appears to be the same that Bonami called the chêne nain. In good soil it grows much larger, and, Bosc observes, has probably been confounded with a variety of *Q.* sessiliflòra, and *Q.* apennìna, under the name of chêne à trochets.

Q. *viminàlis* Bosc Mém. sur les Chênes, p. 316.; Chêne Saule, Chêne Osier, Chêne de Haie, *Fr.* (see p. 1737.); is found in the departments in the east of France. It is common on the Jura, and on the mountains of the Vosges. It seldom grows higher than 6 ft. or 8 ft., with a grey bark; leaves resembling those of *Q.* pedunculàta, but much smaller, of a brighter green, and always very smooth. The fruit is sessile, and the nut is deeply buried in the cup. The wood is white, and so pliant, that it is extremely difficult to break it. Excellent hedges are made of this species in the countries where it is indigenous, because it produces its shoots constantly from the collar, and, consequently, forms a very thick mass of branches, which cross each other, and often form natural grafts. When these hedges are cut down, the larger pieces of the wood are used for fuel, and the smaller shoots made into baskets, which are of very great duration. The stools throw up strong, straight, flexible shoots, 5 ft. or 6 ft. in length, which are excellent for all the purposes of wickerwork. According to Bosc, this species does not change its nature by transplanting; as a tree at Versailles has exactly the same aspect which those have which grow between Langres and Dijon, where, he says, the species is well known to the inhabitants as being quite distinct. So desirable a kind ought certainly to be introduced into Britain; and plants may, doubtless, be obtained from Dijon, or from Messrs. Audibert, at Tarascon.

Q. *áspera* Bosc Mém. sur les Chênes, p. 328.; le Chêne âpre, *Fr.*; has the leaves petioled, coriaceous, of a medium size, elongated irregularly, but not deeply lobed; the lobes broad, pointed, and mucronated. The upper surface of the leaf is studded with small tubercles, beset with stiff bristle-like hairs, disposed in stars, which are very rough to the touch; the under surface is downy. This species does not attain any great height. Bosc states that this oak stands the open air in the neighbourhood of Paris; from which circumstance it may possibly not belong to *Q.* I'lex, which requires protection there during winter.

Chêne Lézermien Bosc Mém. sur les Chênes, p. 328., is nearly allied to the preceding kind; but the leaves are sessile, oval, and simply, though broadly, dentated: they are mucronated and rough above, and downy beneath. Bosc does not mention any Latin name to this oak, but states that he gave its French name in honour of the director of the nursery in which it grew. He adds, "I have received a specimen of this species under the name of chêne Turner; but, as I have stated before, I think that name belongs to the chêne de Gibraltar (*Q.* Pseùdo-Sùber)." Like the preceding sort, the chêne Lézermien is said to be hardy in the neighbourhood of Paris.

Chêne Castillan Bosc Mém. sur les Chênes, p. 328., has the leaves oval, pointed, slightly tomentose beneath, with unequal teeth, each terminated by a sharp turned up point. The acorns are borne three or four together on short peduncles. Bosc found this oak in great abundance in Spain, on the sandy mountains of Old Castile. He observes that it has been probably confounded with *Q.* áspera and the chêne Lézermien, to which it is very nearly allied; and adds, "I have never seen specimens of it more than 10 ft. or 12 ft. high. Its wood appears to be very hard. Its acorns are eaten both raw and cooked, as are those of the two above-named kinds. Their taste is very inferior to that of the chestnut; but it is not disagreeable. The consumption of these acorns in Spain is considerable, if I may judge from the quantities of them that I saw in the market at Burgos, when I passed through that town. This oak grows in the poorest soils." From the above description, it appears to us not improbable that the chêne Castillan may be the *Q.* gramúntia *L.*

Q. *lusitánica* Lamb. Dict., 1. p. 719., Willd., No. 32., N. Du Ham., 7. p. 162., Smith in Rees's Cycl., No. 39.; *Q.* valentìna *Cav. Ic.*, 2. p. 25. t. 129., and our *fig.* 1817.; Róbur 4., *Clust. Hist.*, p. 18., and Róbur 5. p. 19.; Gálla, sive Róbur màjus *Ger. Emac.*, 1348., and G. minor *Ger. Emac.*, p. 1349.; the Portuguese Gall Oak; Chêne du Portugal, *Fr.*; has the leaves elliptical, with deep pointed serratures; downy beneath. Fruit racemose. Calyx hemispherical. Nut oblong. (*Willd.*) A shrub, or low tree, somewhat resembling *Q.* infectòria; a native of Portugal, said to have been introduced into England in 1824. Lamarck says that this species consists of several varieties, all very low shrubs, subject to bear galls; their branches copious and slender; their leaves small, intermediate in form between the evergreen and the ordinary oaks of Europe. Willdenow describes the leaves as 1 in. long, oblong, obtuse, and rigid; their serratures somewhat pointed; the upper surface polished and smooth; the under hoary with slender, starry, crowded hairs. Footstalks short. Fruit racemose, or, rather, on a sort of spike.



1817

Willdenow adds that the figure of Cavanilles scarcely answers to the plant in question; and, indeed, that author describes his species as a tree taller than *Q.* I'lex, with deciduous leaves, and large solitary acorns. (See *fig.* 1817., reduced from the figure of Cavanilles, and which shows a gall on one of the leaves.) Bosc says that this species is cultivated in the Pépinière du Roule, where it was a shrub from 5 ft. to 6 ft. in height, and retained its leaves till the end of winter. It flowered freely, but did not produce any fruit, and could only be propagated by inarching. Capt. Cook, as we have seen p. 1906. thinks this species the *Q. Ballòta* of Valencia, and the same as the *Q. Ballòta* of which he saw plants some years ago at Messrs. Malcolm's.

Q. *prásina* Pers. Syn., 2. p. 568., N. Du Ham., 7. p. 161. t. 44. f. 1., and our *fig.* 1818.; *Q.* glaúca *Bosc Mém. sur les Chênes*, p. 26.; has the leaves persistent, oval-oblong, dentated, and rather spiny; very smooth, and glaucous; acorns on peduncles. This oak does not attain a great height; but, according to the *Nouveau Du Hamel*, it partakes more of the character of a tree than of a shrub. From a specimen in the Jardin des Plantes, it appears that the full-grown tree would probably be about 15 ft. or 20 ft. high, with numerous, slender, spreading branches, perfectly smooth. The leaves



1818

are of a glaucous green, quite glabrous on both sides; on rather long footstalks, of an oblong oval form, with the indentations generally terminating in a short bristly spine. The flowers are generally produced two or three together at the extremity of the branches, on a peduncle about 6 lines long. This oak is said to be a native of Portugal.

Q. *calycina* Poir. Dict. Encyc. Suppl., 2. p. 216., N. Du Ham. 7. p. 159., has oval-elliptic leaves, cottony and yellowish beneath. Nuts ovate-oblong, in a long pubescent calyx. This oak, according to M. Poiret, greatly resembles the ilex. It is of middling size, with numerous unequal branches, covered, when young, with an ash-coloured down. The leaves are oval, and slightly pointed at the apex; about 1 in. long, entire, or slightly dentated with a few small teeth; smooth and shining above, except when quite young; cottony and rather yellowish beneath, with downy petioles. The acorns are oval, very long, and borne on short, thick, axillary peduncles. The nut is enveloped for three quarters of its length in a very deep pubescent calyx, often 8 or 9 lines long, covered with very closely set scales, and warty. This tree is a native of France, having been found near Orange, in the department of Vaucluse, by M. De Bressieux, who sent specimens of it to M. Poiret.

Q. *expánsa* Poir. Dict. Encyc. Suppl., 2. p. 217., N. Du Ham., 7. p. 158., has the leaves oval, and slightly dentated; white and cottony beneath; acorns oval on peduncles, with very large, pubescent, bell-shaped calyxes. This oak differs very slightly from *Q.* calycina, and is a native of the same habitat. It is about 12 ft. or 15 ft. high; dividing into numerous branches, which are downy when young. Its leaves closely resemble those of *Q.* calycina, except in being rather shorter, and that their downy pubescence beneath is white, instead of being yellowish. The acorns are shorter, and thick; and the calyx is nearly flat, and bell-shaped. Poiret mentions two forms of this species differing slightly in the calyx.

Q. *rotundifòlia* Lam. Dict., 1. p. 723., Willd. Sp. Pl., 4. p. 434., N. Du Ham., 7. p. 158., Rees's Cycl., No. 37.; the round-leaved Spanish Oak; Chêne à Feuilles rondes; has persistent leaves, which are obovate-oblong, with spinous teeth, heart-shaped at the base, smoothish above, and downy beneath. This oak is very imperfectly known, as neither Lamarck nor Willdenow had seen either its flowers or fruit. The acorns are said to be sweet and eatable. It is a native of Spain, whence it was brought to France; and there is a small plant in the Jardin des Plantes. In the *Nouveau Du Hamel*, it is said to be possibly a variety of *l'Ilex*; but Bosc supposes it to be either closely allied to, or identical with, *Q.* gramúntia. There are numerous plants of it, he says (writing in 1806), in the Paris gardens.

Q. *humilis* Lam. Dict., 1. p. 719., Willd. Sp. Pl., 4. p. 435., Ger. Emac., 1340., N. Du Ham., 7. p. 161., Rees's Cycl., No. 38.; *Q.* pèdem vix sùperans *Bauh. Pin.*, 420.; Ròbur 7., sive *Q.* pùmila, *Clus. Hist.*, 1. p. 19.; the dwarf Portuguese Oak; Chêne pygmée, *Fr.*; has the leaves obovate, with spiny teeth at their apex, and rather heart-shaped at the base; downy beneath. Calyx of the fruit flattened. Nut oblong. This curious little shrub was found by Clusius, in barren sandy ground near Lisbon, very abundant. The whole plant is rarely more than 1 ft. high when wild; though Lamarck says that, by cultivation, it may be made to attain the height of 3 ft. or 4 ft. The leaves strongly resemble those of the ilex. They are about 1 in. or 1½ in. long, on very short footstalks; smooth and shining above, downy and hoary beneath; the larger veins straight and parallel, and the smaller ones reticulated. The acorns are sessile; the nut is oblong, and more bitter than that of the common British oak, with a very shallow, and rather flattened, calyx. This is still common in sandy soil in Portugal. The *Q.* hùmilis of the London gardens, noticed in p. 1924., is a very different plant from that here described.

App. iii. *African Oaks which have not yet been introduced.*

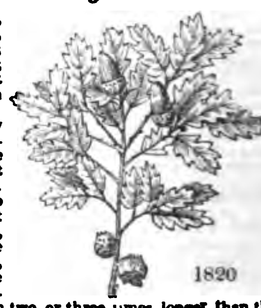
Q. *obtécta* Poir. Dict. Encyc. Suppl., 2. p. 218., N. Du Ham., 7. p. 163., has the leaves nearly oval, slightly toothed, glabrous, shining. Acorns on peduncles, nearly solitary. Nut hidden in the cup. The branches of this species are ash-coloured, glabrous, and extremely flexible. The leaves are entire, or bordered with a few spiny teeth. The cup only opens a little at the extremity, and is closely imbricated; the upper scales being looser than the others, and somewhat recurved at the point.

App. iv. *Oaks of Asia Minor and Persia not yet introduced.*

Q. *infectòria* Oliv. Voy. dans l'Emp. Ottom., 1. p. 253. t. 14, 15., Oliv. Trav., Eng ed. 2., p. 42. t. 14. and 15., N. Du Ham., 7. p. 162. t. 49. f. 1., Willd., No. 33., Rees's Cycl., No. 40.; *Q.* cariénsis *Willd.*; Chêne à Galles, *Fr.*; Färber Eiche, *Ger.*; and our *figs.* 1819. and 1820.; the first from Olivier, and the second from Du Hamel. Leaves ovate-oblong, very smooth on both sides, deeply toothed, somewhat sinuated, deciduous. Fruit sessile; ripening the second year. Calyx tessellated. Nut elongated, nearly cylindrical. (*Sm.* and *Willd.*) This oak, according to Olivier, seldom attains the height of 6 ft.; and the stem is crooked, with the habit of a shrub, rather than that of a tree. The leaves are about 1 in. or 1¼ in. long, deciduous, bright green, smooth on both sides, but paler beneath; their serratures are deep and broad, not acutely pointed. Fruit solitary, nearly sessile. Cup slightly downy; its scales not very distinct. Acorn two or three times longer than the cup, smooth, nearly cylindrical. Olivier observes that this plant, besides producing the galls of commerce, bears a number of different kinds of this excrescence, which are neglected as useless. The tree, according to Bosc, has been long in the Jardin des Plantes at Paris, where it bears the winters quite well in the open air, losing its leaves in the autumn. He has no doubt that it may be propagated in abundance in the south of France; but considers it doubtful whether the insect could be introduced and multiplied there with equal facility. According to the catalogues, this

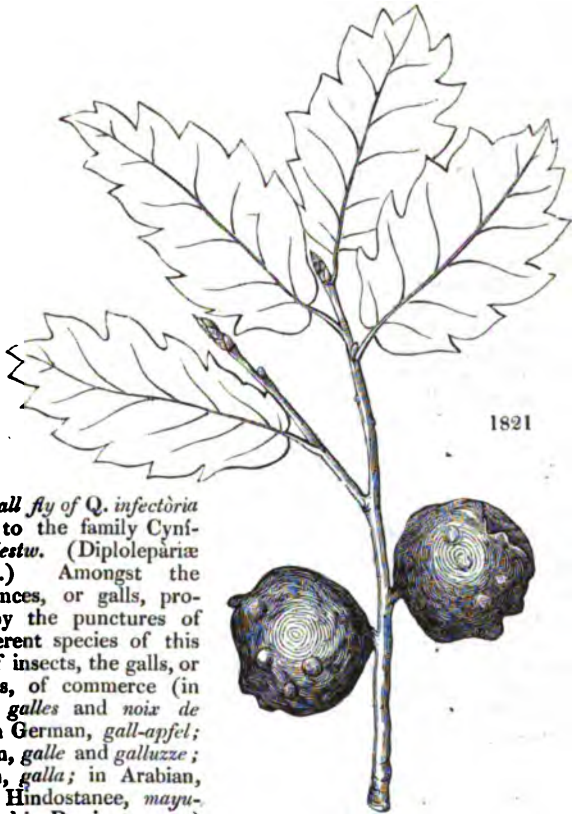


1819



1820

species was introduced into England in 1822; but we have never seen it, and we are not aware that there is a living plant of it in the neighbourhood of London.



1821

The gall fly of Q. infectòria belongs to the family Cynípidæ *Westw.* (Diplolepàriæ *Latreille.*) Amongst the excrescences, or galls, produced by the punctures of the different species of this family of insects, the galls, or nut galls, of commerce (in French, *galles* and *noix de galle;* in German, *gall-apfel;* in Italian, *galle* and *galluzze;* in Latin, *galla;* in Arabian, *afis;* in Hindostanee, *mayuphal;* and in Persian, *mayer*) are by far the most valuable, being much employed in the manufacture of ink, as well as occasionally for medicinal purposes. These galls, which, when full grown (*fig.* 1821.), are of the size of a boy's marble, of a rounded form, and rather uneven surface, are attached to the slender stems of the branches of *Q.* infectòria, and are produced by the Diplólepis, or, more properly, Cỳnips Gállæ tinctòriæ *Oliv. Enc. Méth.,* vi. p. 281.; Cỳnips scriptòrum *Kirby and Spence Intr.,* i. p. 319. This insect (*fig.* 1822. *d*) is of a pale brown colour, and may often be found enclosed in the galls sold in the shops of the druggists, &c.; these galls having been collected before the insect had made its escape. *Fig.* 1822. *a* is a section of one of these galls. The natural history of this family of insects may be stated in a very few words, although the physiological nature of the changes which take place in the action of the juices of the plants attacked by them, whereby galls of a very great diversity of form are produced, has not been ascertained. The female Cynípidæ are furnished with an instrument, or ovipositor, of a curved form, and, for the most part, concealed within the abdomen, the extremity only

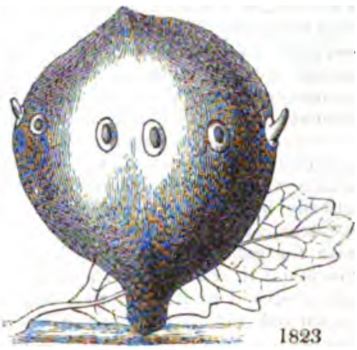


1822

being slightly exposed. After impregnation, the eggs are deposited by means of this boring instrument, which is exsertile, within the leaves or twigs of various plants; shortly after which the galls are formed on the outside of the attacked part, the eggs being forced from the place where they were originally deposited, and occupying the centre of the newly formed gall, which is generally of a fleshy nature, and serves as food to the young grub (*fig.* 1822. *b*), when hatched; the pupa state (*fig.* 1822. *c*) succeeds, and is passed either within the gall, as in the insect now under consideration, or in the earth; the larva having previously to its change eaten its way out; soon after which, the insect assumes its imago state. Hence, it will be at once obvious, that a gall, from which the insect has escaped, must necessarily contain less astringent principle than one which has its interior less consumed by the insect, which still remains enclosed therein; and hence it is that there are two kinds of gall nuts known in commerce: those which still contain the insect, and which are known in the trade under the names of black or blue galls and green galls, and termed *yerli* by the natives of the countries where they are collected; and those from which the insect has escaped, and which are called white galls. The latter contain not more than two thirds of the astringent qualities of the former, and are of a pale brown or whitish colour, less compact, and not so heavy. (*Oliv. Voy. dans l'Empire Ottoman;* and *Travels in Egypt,* vol. ii. p. 61.) Mr. M'Culloch states that these galls "are principally exported from Aleppo, Tripoli, Smyrna, and Said: those brought from the first come chiefly from Mosul, on the western bank of the Tigris, about 10 days' journey from Aleppo. The real Mosul galls are unquestionably the best of any: but all that are gathered in the surrounding country are sold under this name. Those from Caramania are of very inferior quality. The gall nuts met with in India are carried thither from Persia by Arabian merchants." (*Com. Dict.*, p. 595.) General Hardwicke, however, states that he discovered the tree upon which they are found in the neighbourhood of Adwuanie. (*Asiat. Rep.*, vol. vi. p. 376.) "The price of galls, in the London markets, varies from 65*s*. to 85*s*. per cwt. The duty is 5*s*. per cwt." (*M'Cull. Com. Dict.*, art. Gall.) The white and blue galls are generally sold mixed together in about equal proportions, and are then called galls in sorts; and occasionally fraud is attempted by dyeing the white galls with a blue dye, but their lighter weight will render it easy to detect them at once.

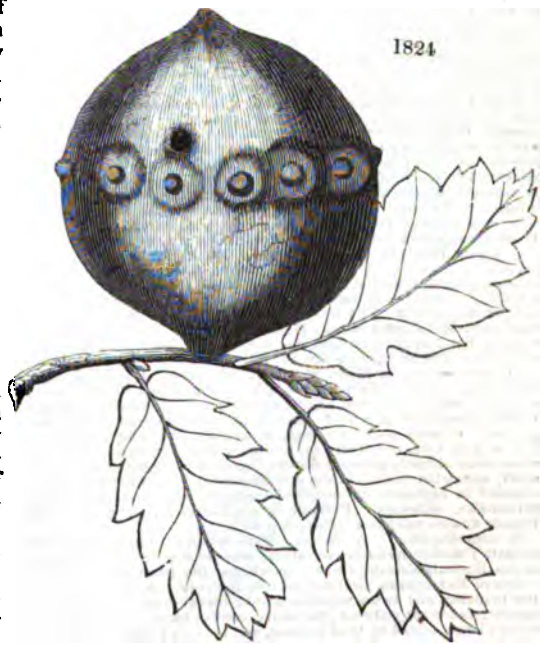
The chief use made of these galls is in the manufacture of common writing ink, which is made by adding an infusion of the gall nut to sulphate of iron dissolved in water. A very fine precipitate is thrown down, the speedy subsidence of which is prevented by the addition of a proper quantity of gum arabic. This is usually accounted for by the superior affinity of the gallic acid; which, combining with the iron, takes it from the sulphuric acid, and occasions it to fall down. Logwood is also a useful ingredient in ink, its colouring matter uniting with the oxide of iron, and rendering it not only of a very dark colour, but less liable to change from the action of acids, or the external air. The application of heat is also necessary; because by its action the galls are almost entirely soluble in water, which is not the case when they are simply macerated. Gallic acid may be obtained from the infusion, merely by sublimation. The solution also contains a large quantity of tannin, as it gives a very copious precipitate with solution of gelatine. The proportion of these ingredients in 815 grains of solid matter are, according to Sir Humphry Davy, as follows: — 130 of tannin, 31 gallic acid, 12 saline and earthy matter, and 12 supposed to be mucilage and extractive matter. Gall nuts are also very extensively used in dyeing; and, being the most powerful of vegetable astringents, "they are frequently used with great effect in medicine, both externally and internally, in the form of powders, infusions, tinctures, or ointments; as in long protracted and obstinate diarrhœas, intestinal hæmorrhages, and intermittents; and, when judiciously combined with tonics and aromatics, have been found useful. Much caution is, however, required in administering so powerful a medicine; and the dose should not exceed 10 grains or a scruple three times a day. An

infusion, made with 2 drachms of bruised galls to 12 ounces of boiling water, may be used as an injection; and, in conjunction with a small portion of spirits of wine, forms a good gargle for relaxation of the uvula." (*Stephenson and Churchill's Medical Botany*, vol. iv. pl. 152.) M. Robiquet (as quoted in the *Athenæum* for April 15. 1837) has been making various experiments on the tannin and gallic acid contained in gall nuts. One of the most remarkable results obtained by him is, a knowledge of the great difference of time which it takes to transform pure tannin into gallic acid, and to produce it from the entire nut. Eight months will not complete the former operation, while one month is sufficient for the latter; a proof that the gall nut contains principles, perhaps gum or rather mucilage, which facilitate fermentation. Another important result is a confirmation of the opinion of M. Polonger, that gallic acid is to be derived from tannin.



1823

The Dead Sea Apple. Olivier informs us that Quércus infectòria also produces another sort of gall (*fig.* 1823. from copy furnished us by Mr. Westwood; and *fig.* 1824. from the figure given by Oliver, t. 15.), of a much larger size than the common gall nut, of a spongy substance, very light, of a brownish red colour, covered with a resinous coat, and furnished with a circular row of tubercles, placed round the centre. Olivier does not, however, appear to have been aware of the identity of these galls with the far-famed apples of the Dead Sea, the nature of which has so greatly perplexed naturalists, and which are mentioned, both by Tacitus and Josephus, as being beautiful to the eye, but crumbling at the touch to dust and bitter ashes. By some writers, the existence of these vegetable productions has been entirely doubted. Pococke supposes them to be pomegranates left for two or three years upon the tree; Hasselquist pronounced these "Poma sodomitica," as they have been called, to be the fruit of the Solànum *Melongèna* (the egg plant, or mad apple); Seetzen considered them to be the fruit of a species of cotton tree; Châteaubriand the fruit of a shrub; and Captains Mangles and Irby have no doubt that they have discovered them in the oskar plant. Mr. Conder, how-



1824

ever, (*Mod. Trav.: Palestine.*) who has collected the opinions of all these authors, doubts the correctness of all of them; observing, "If it be anything more than a fable, it must have been a production peculiar to that part of Palestine, or it would not have excited such general attention. It is possible that what they (Tacitus and Josephus) describe may have originated, *like the oak galls in this country*, in the work of some insect." A. B. Lambert, Esq., having received some of these far-famed apples ("Mala insana") from the mountains east of the Dead Sea, whence they had been brought by the Hon. Robert Curzon, read an account of them before the Linnæan Society, proving them to be galls of a species of oak containing an insect. No description is given by Mr. Lambert of the insect; but Mr. Westwood, who furnished this article, states that it belongs to the family Cynípidæ, and is infested parasitically by a species of the family *I*chneumónidæ. Mr. Lambert, by some accident, was led into the supposition that the Dead Sea apples are identical with the galls of commerce (*Linn. Trans.*, xvii. p. 446.); but this is not the case. Olivier, in speaking of this insect, and the gall produced by it, says that both differ from those of the tauzin oak (*Q.* pyrenàica: see fig. 1697. p. 1842.); and that the insect (*fig.* 1825.) has a body of brown and fawn-colour mixed, with the antennæ blackish. (*Trav.*, Eng. ed. 2., p. 43.)



1825



1826

Q. Libàni Oliv., t. 49. f. 2., N. Du Ham., 7. p. 167. t. 49. f. 2., and our *fig.* 1826., has the leaves on petioles, oblong, smooth, shining, and dentated, with mucros at the points of the teeth. The acorns are of a roundish oval, a little hollow at the summit. The scales of the calyx are placed close together, and scarcely imbricate. The branches are of a reddish brown, and perfectly glabrous. This oak, which bears some resemblance in its leaves to those of the chestnut, was discovered on Mount Lebanon by Olivier, who sent home specimens of it to Desfontaines. The leaves are perfectly glabrous on both sides, shining, and of a lively green above; and the teeth are distinctly marked by a sharp and conspicuous mucro. The acorns are sessile, or on very short peduncles; the nut is large, depressed, rather hollow at the summit, and enveloped for more than half its length in a cup, the scales of which are rather soldered together side by side, than imbricated: the centre of each only is a little prominent, like those of the cones of some kinds of pine. (*N. Du Ham.*) It does not appear that living plants of this species have ever been brought to Europe. The figure in the *Nouveau Du Hamel*, of which ours is a reduced copy, was taken from a dried specimen in the herbarium of Desfontaines. From the appearance of the cup, this would seem a very distinct species.

Q. rígida Willd. Sp. Pl., 4. p. 434., N. Du Ham., 7. p. 161., Rees's Cycl., No. 36.; ? *I'lex aculeàta*, &c., *Tourn. Cor.*, 40. Leaves oblong, undivided, with spinous serratures, smooth; glaucous beneath; heart-shaped at the base. Footstalks bearded at the summit. Scales of the calyx rigid, spreading. (*Willd.*) A native of the coast of Caramania, in Asiatic Turkey. The branches are pale brown, dotted. The leaves are oblong, 1 in. or more in length, rigid, with spiny serratures; deep green and shining above; glaucous beneath; heart-shaped at the base. Footstalks very short, smooth, but furnished on each side with a line of brownish hairs, which is carried on up the midrib of the leaf. The acorn is sessile; and the calyx is beset with rigid, woody, lanceolate, spreading scales.

Q. ibérica Stev. in Mém. Soc. Imp. Nat. Mosc., 4. p. 70. M. a., Bieb. Fl. Taur.-Cauc., 2. p. 402. No. 1913., 3. p. 620. Leaves ovate-oblong, downy beneath, sinuated; lobes short, blunt, somewhat serrated; serratures blunt. Fruit almost sessile. Scales of the cup mucronate. (*Eichwald Plantæ Caspico-Caucasicæ*, 2. p. 40. t. 38.) A native of Georgia and Imiretia. Bark smooth, not corky, greyish. Petioles 2—4 lines long, somewhat downy or glabrous, semicylindrical. Leaves from 1 in. to 1½ in. long, and from 2 in. to 3 in. broad; obovate-oblong, acute; truncated at the base, somewhat arrow-shaped; glabrous above; densely covered with white tomentum beneath; sinuated; lobes short, somewhat ovate, obtuse, or rather acute, somewhat serrated; serratures blunt. Male flowers disposed in aggregate catkins, 2—5 springing from one bud; lateral, slender, interrupted. Rachis thread-like, pubescent. Perianth deeply 5—6-cleft; the divisions linear, ciliated. Stamens 5—10. Female flowers unknown. (*Ibid.*, 2. p. 41.)

Q. castaneæfòlia C. A. Meyer. Bark smooth. Leaves on footstalks, oblong-lanceolate; hairy beneath; thickly serrated; serratures somewhat mucronate. Cups sessile, solitary, hemispherical. Scales linear-lanceolate, thickly imbricated the contrary way. Nut oblong-cylindrical. A tree, a native of Mazanderan, near the town of Balfrush. A very distinct and beautiful species. Bark of the branches and twigs membranaceous (never corky), yellow, warted. Petioles ½ in. to 1 in. long, slender, somewhat glabrous; flat above, convex beneath. Smaller leaves 2½ in. long, and 9 to 10 lines broad; larger ones 4 in. to 4½ in. long, and 1½ in. to 1¾ in. broad; all of them oblong-lanceolate, round, and frequently unequal, at the base, more or less pointed, thickly serrated; serratures blunt, pointed with small mucros (scarcely ½ a line long); shining above, rarely covered with stellate down; hairy beneath from minute stellate down, ash-coloured; veins parallel, prominent, having long hairs at their axils. Male flowers not seen. Cups lateral or terminal, sessile, hemispherical, 8 to 10 lines in diameter; clothed in the inside with copious, soft, simple hairs; externally, with numerous, downy, linear-lanceolate scales, about 3 lines long; and, towards the base, 1 line broad, all of them more or less pointed, rigid, imbricated the contrary way. Nut 1½ in. long, cylindrical, 3 or 4 times as long as the cup; thickish at the base, blunt at the apex; mucronate, smooth, reddish brown. (*Eichwald Plantæ Caspico-Caucasicæ*, 1. p. 9. t. 1.; and our *fig.* 1827.)

Q. mongólica Fisch. A rare species, indigenous to the banks of the Argun in Tartary, and apparently of diminutive growth. There have been plants since 1835 in the Flötbeck Nurseries, which appear perfectly hardy. (*Booth.*) We trust that in 1838, or even before, this species will be introduced into England.



1827

App. v. *Himalayan Oaks not yet introduced.*

It is observed by Dr. Royle, that the Himalayan oaks vary much in appearance, and that, in all probability, the number of kinds at present enumerated as species will hereafter undergo "some reduction." It has also been suggested to us by Professor Don, that several of the Nepal and Japan oaks described by authors under different names are probably the same.

Q. *spicàta* Smith in Rees's Cycl., No. 12., D. Don in Prod. Fl. Nep., p. 56., Wallich Pl. As. Rar.



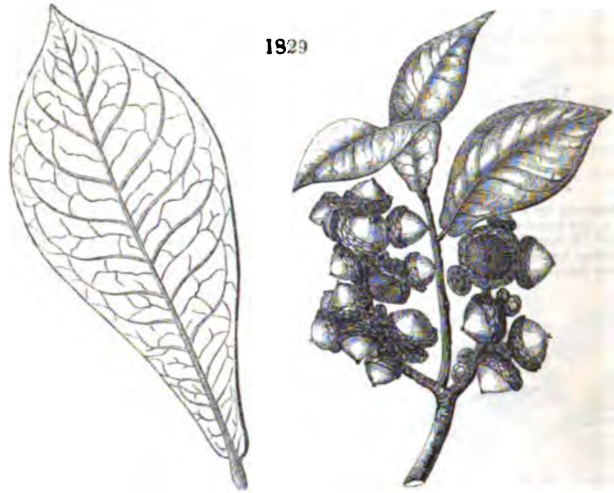
1828

Catkins long and slender, erect, axillary, solitary, in terminal fascicles. Fruit in fascicles, upon a very long spike. Nut roundish, smooth, terminated by a point. Cups very small, lamellar. (*Wallich.*

t. 46., and our *fig*. 1828.; *Q.* squamàta *Rox. Hort. Beng.*, p. 68.; *Q. A'rcula* Ham. MSS. Leaves elliptic-lanceolate, quite entire, very sharply pointed; acute at the base; sometimes obtuse, smooth. "This is one of the largest, as well as the commonest, sorts of oak in Nepal, where it attains the most gigantic size. The wood is exceedingly like the English oak in colour, and, most probably, equals it in other respects; but the mountaineers do not esteem it much, owing, as they say, to its speedy decay; a circumstance owing, no doubt, to their employing it in its green state. A similar prejudice prevails in that country against the other species. I am unable to distinguish it," Dr. Wallich adds, "from Dr. Roxburgh's *Q.* squamàta, which is a native of the mountains bordering on the district of Silhet. It flowers in April and May, and the fruit is ripe in October." (*Wall.*) "Female flowers on a separate tree [probably accidentally], crowded 3 together in sessile groups along the spikes. Acorns eatable, but not very good; the size and shape of a large filbert, even-pointed, dark brown; their cups short, scaly." (*Smith* in *Rees's Cycl.*)

Q. obtusifòlia D. Don Prod. Fl. Nep., p. 56. Leaves heart-shaped, oblong, quite entire; tomentose beneath, rounded at the apex. Cups urceolate, campanulate, nearly sessile, extremely scaly, tomentose. Nuts globose, blunt. A tree, a native of Nepal.

Q. grandifòlia D. Don, Lamb. Gen. Pin., 2. t. 8., and our *fig*. 1829. The Magnolia-leaved Oak.



1829

Branchlets round, glabrous. Leaves obovate-oblong or elliptic, quite entire, almost sessile; naked and shining on both sides; auriculate at the base. Fruit terminal, in clusters. Cups sessile, rugged. Nuts roundish, having small mucrones. (*D. Don.*) A native of the woods of Nepal, where it was discovered by the collectors sent out by Dr. Wallich. A large tree. Leaves from 9 in. to 1 ft. 6 in. long, and from 4 in. to 6 in. broad above the middle; its fine green foliage (vying, in this respect, with the American magnolias), and sessile glomerated fruit, distinguish it from every other known species. (*Lamb. Gen. Pin.*, t. 8.)

Q. velutìna Lindl. in Wall. Pl. As. Rar., t. 150., and our *fig*. 1830. Leaves ovate-lanceolate, serrated, glabrous, shining; of the same colour on both sides; quite entire and wedge-shaped at the base; petioled; veins disappearing in the margin; veinlets inconspicuous. Cups solitary, on short peduncles, somewhat top-shaped, velvety; composed of scales forming closely imbricated concentric layers, which surround the nut. Nut velvety, having 6 styles, depressed, bossed, a little longer than the nut. Branches covered with small glands. (*Lindl. MSS.*) A native of Tavoy, on the shore of Tenasserim; and bearing fruit in October. Branches slender, cylindrical, densely marked with innumerable callous dots; yellow, shining, and glabrous. Buds small, roundish, villous. Leaves about 4 in. long, approximate towards the point of the branchlets. Inflorescence not seen. Fruit axillary, solitary, almost sessile. (*Wall. Pl. As. Rar.*, t. 150.)



1830

Q. lamellòsa Smith in Rees's Cycl., No. 23., Wall. Pl. As. Rar., t. 149., and our *fig*. 1831.; *Q.* imbricàta *Ham. MSS.*, *D. Don Prod. Fl. Nep.*, p. 57. Leaves elliptic or ovate, serrated, flat, glabrous, acute, on long footstalks; obtuse at the base; glaucous beneath; the veins continued to the serratures; veinlets raised. Cups solitary, sessile, depressed, downy; composed of scales forming loosely imbricated, undulated, concentric layers, which surround the nut. Nut tomentose, bossed, depressed, shorter than the cup. (*Lindl. MSS.*) A native of the mountains of Nepal; ripening its

fruit towards the end of the year. The following are Dr. Wallich's observations on this species: —"This noble oak has been so well described by Sir J. E. Smith in *Rees's Cyclopædia*, that I have very little to add in this place. The young branches are thick, cylindric, and glaucous. Buds terminal, fascicled, or axillary and solitary; ovate, obtuse, with many rounded, villous, and silky scales. Leaves very handsome, of a firm and leathery texture, sometimes 1ft. long, and as much as 5 in. broad; smooth and glossy above; more or less mealy, sometimes nearly white, underneath. The fruit is remarkably large, being as much as 2 in. in diameter." (*Wall. Plan. As. Rar.*, t. 149.) Smith mentions that it was discovered by Dr. Buchanan (Hamilton) in the remote woods of Nepal, bearing fruit, in December, 1802.



1831

Q. semicarpifòlia Smith in Rees's Cycl., No. 20., Wall. Pl. As. Rar., t. 174.; and our *fig.* 1832.; *Cassìna* Ham. MSS., D. Don Prod. Fl. Nep. Leaves ovate-oblong, blunt, undivided, entire, undulated, retuse at the base; covered with starry down beneath; the nerves and the midrib very prominent. Fruit axillary, terminal, solitary or in pairs, almost sessile. Nut ovate, bossed, smooth. Cup scaly, imbricated, half the length of the nut. (*Wallich.*) A native of Nepal, flowering in April, and producing its fruit in September. This tree, Dr. Wallich observes, "inhabits the summit of lofty mountains, constituting, together with the common Nepal rhododendron, the chief forests of the country, and attaining a gigantic size. It measures frequently from 80 ft. to 100 ft. in height, with a girt of the trunk, at 6 ft. above the ground, of 14 ft. to 18 ft. I have met with individuals of far greater dimensions on the summit of Sheopur. The wood is much esteemed by the natives, who employ it for various purposes of building, and for making bedsteads. The acorns are axillary and terminal, mostly solitary, though sometimes geminate, oval, shining brown, smooth, about 1 in. long, terminated by a short columnar style, and supported by hemispherical cups, about half their size; each having a sharp and entire circular orifice, with the outer surface densely tomentose, and covered with numerous, small, lanceolate, acute, imbricate scales. All the young parts, as well as the male inflorescence, the under surface of the leaves, and the cup, are covered with a copious, stellate, loosely attached tomentum. The leaves, in young trees, are more or less spinous-dentate." (*Wall. Plan. As. Rar.*, t. 174.) This oak would be a most desirable species to introduce, as it appears from Dr. Royle's *Illustrations of the Botany of the Himalayas*, to be much hardier than *Q.* lanàta. (See p. 1921.) He adds that *Q.* semicarpifòlia generally forms the forests at their highest limits, at from 10,000 ft. to 12,000 ft. of elevation: it is found higher than any of the pines. At about 10,000 ft. on the mountain of Kedarkanta, the encampment was formed in "an open glade, surrounded with magnificent trees of *A'*bies (*Picea*) Webbiàna, and *Quércus* semicarpifòlia; among which *R*hododéndron campanulàtum formed a large straggling shrub, in full flower, even in the midst of the melting snow." (*Illust.*, p. 22.) Dr. Royle also mentions that the inhabitants of the mountains stack the leaves of Grèw*ia*, *U'*lmus, and *Quércus*, as a winter food for cattle (p. 19.); and that he found a new *Quércus* in the valleys of the mountains, at an elevation of about 12,000 ft.



1832

App. vi. *Oaks of Japan, Cochin-China, and China, which have not yet been introduced.*

Q. *glàbra* Thunb. Jap., 175., Willd. Sp. Pl., 4. p. 427., N. Du Ham., 7. p. 152., has the leaves oblong-lanceolate, glabrous, acuminate, narrowed at the base, and yellowish beneath. A tree, a native of Japan, with rugged, knotty, slightly spreading branches, generally growing two or three together; with alternate leaves, entire on the margin, and feather-nerved; glabrous on both sides; shining

above, and yellowish beneath. The flowers are disposed in two or three cottony spikes at the termination of the branches.

Q. *concéntrica* Lour. Coch., 2. p. 572., Willd. Sp. Pl., 4. p. 427., N. Du Ham., 7. p. 153., Smith in Rees's Cycl., No. 10. Leaves lanceolate-ovate, pointed, incurved, entire. Calyx lax, very short, furrowed concentrically. (*Willd.*) A large tree, a native of the lofty forests of Cochin-China; with ascending branches, and comparatively few leaves, which are stalked, and smooth on both sides. The acorns are oblong-ovate, and borne on peduncles; the nuts are smooth, red, pointed; and the cups short and lax, marked externally with several parallel circular furrows.

Q. *acùta* Thunb. Jap., 175., Willd. Sp. Pl., 4. p. 429., N. Du Ham., 7. p. 154., Smith in Rees's Cycl., No. 17., has the leaves oblong, entire, and terminating in a sharp cuspidate point; rounded at the base; glabrous above, but downy beneath when young. The branches of this oak are knotty, smooth, except near their extremities, which are downy. The under sides of the leaves are, also, covered with a ferruginous down, when young, as are the spikes of flowers. A native of Japan.

Q. *serràta* Thunb. Jap., 176., Willd. Sp. Pl., 4. p. 431., N. Du Ham., 7. p. 155., Smith in Rees's Cycl., No. 25., has the leaves oblong, serrated, velvety, and downy beneath, when young, with parallel veins. The trunk of this oak is divided into alternate, and rather knotty, branches, which are of a greyish colour, with white spots. Found on the mountains of Japan.

Q. *glaùca* Thunb. Jap., 175., Banks Ic., Kæmpf., t. 17., Willd. Sp. Pl., 4. p. 427., N. Du Ham., 7. p. 159., Rees's Cycl., No. 21.; Kas no Ki, *Kæmpf. Amæn.*, p. 816.; has the leaves obovate, pointed, serrated towards the extremity, and glaucous beneath. The nuts are roundish and pointed; and the calyx, which is shallow, is marked with concentric lines. Kæmpfer calls this oak an "ilex, with short thick acorns, of which there are two kinds." Thunberg found it near Nagasaki, in Japan. He describes it as a very large tree, with spreading branches, somewhat resembling the ilex, or cork tree; but with very large, broad, pointed leaves, smooth above, and very glaucous or mealy, and feather-nerved beneath. Smith supposes it to be the same as his *Q.* annulàta, *Q. Phullàta* Don. (See p. 1922.)

Q. *cuspidàta* Thunb. Jap., 176., Willd. Sp. Pl., p. 430., N. Du Ham., 7. p. 159., Smith in Rees's Cycl., No. 24.; *Sii*, vulgò Sai no Ki, *Kæmpf. Amæn.*, 816. Leaves ovate, pointed, serrated, smooth. Calyx prickly. (*Thunb.*) Kæmpfer calls this "Fàgus fòlio Fráxini," a beech, or beech-like oak, with the leaves of an ash: but Thunberg describes it as only differing from *Q.* coccífera in its leaves being cuspidate, and their teeth not spiny. The leaves are small, and very glabrous; and the acorns, which are as large as a common walnut, have bristly cups. A native of Japan.

Q. *dentàta* Thunb. Jap., 177., Willd. Sp. Pl., 4. p. 452., N. Du Ham., 7. p. 180., Rees's Cycl., No. 26.; Koku, *Kæmpf. Amæn.*, 816. Leaves ovate-oblong, obtuse, deeply toothed; downy beneath. (*Thunb.*) A tree, with thick, erect, furrowed, knotty branches; cottony at the summit of the tree. The leaves are produced in tufts at the extremity of the branches, on very short petioles: they are soft to the touch, very lax and pliable, velvety on the upper surface, and covered with a very white cottony down beneath. Kæmpfer calls this tree the white ilex, and says that the wood is also white. Thunberg states that it is a native of the hills of Japan.

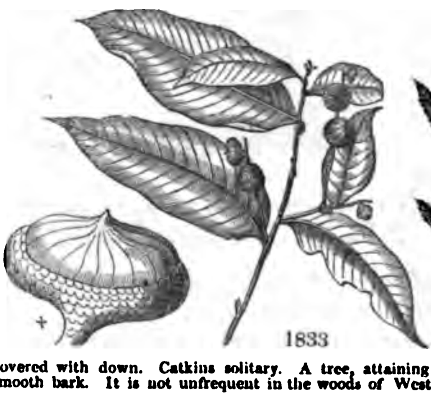
The oaks of China have been enumerated, as far as they are known, in p. 177. The following have been described:—

Q. *chinénsis* Bunge Mém. Acad. Scien. Petersb., 2. p. 135. Leaves ovate-oblong, elongated, acuminated, mucronato-serrate; hoary beneath. Cups axillary, twin. Scales lanceolate, hoary; exterior ones squarrose, longer than the globose nut. A tree, a native of mountainous places in China; flowering in April, and ripening its fruit the following year. It has exactly the habit and leaves of *Castànea vésca*, and is probably the *C.* chinénsis of Sprengel, with 1-seeded fruit. *C.* vésca is a very common tree in the north of China, with fruit always 2—3-seeded, and very like those of Europe; and the Chinese deny that there is any other species.

Q. *obovàta* Bunge Mém. Acad. Scien. Petersb., 2. p. 136. Leaves obovate, nearly sessile, thickly sinuated; lobes round, quite entire, covered with rough dots above; tomentose beneath, as are the young branches. Fruit terminal, aggregate, sessile. Outer scales of the cup ovate-oblong, blunt, silky; inner ones elongated, linear, acute, bent back, longer than the roundish nut. A tree, a native of mountainous places near Pekin; flowering in March and April. Bunge observed a third species, on the mountains in Pan-Schan, very similar to *Q.* mongólica *Fisch.* (see p. 1932.); but nothing certain can be determined respecting it, from the imperfection of the specimens.

App. vii. *Oaks of Java, Sumatra, and the Molucca Isles, not yet introduced.*

Q. *sundàica* Blume Fl. Jav., t. 2. and 3.; and our *figs.* 1833. and 1834. The Sunda Oak. Leaves elliptic, acuminate; narrowed towards the base; glabrous above, somewhat glaucous beneath; veins



1833



1834

covered with down. Catkins solitary. A tree, attaining the height of 80 ft. and upwards, with smooth bark. It is not unfrequent in the woods of Western Java, in low grounds, and on the

banks of rivers. It is nearly allied to *Q. molúcca Rumph.* The wood, although more fibrous and less compact than that of the common oak of Europe, is fit for building, more particularly when in water. (*Blume.*)

Q. pruinòsa Blume Fl. Jav., t. 1.; and our *fig.* 1836. The frosty Oak. Leaves ovate or oval-oblong, acuminate; roundish at the base. Branchlets and leaves covered beneath with small yellowish scales. Fruit aggregate, in short spikes. Cup concave, covered with small scales. Nuts roundish-ovate. A beautiful tree, from 50 ft. to 60 ft. high, with a thick bark. A variety of this species has the leaves oval-oblong, and acute at each end; and the midrib and branchlets downy. Common in woods upon mountains. (*Blume.*)


1835


1836

Q. angustàta Blume Fl. Jav., t. 7.; and our *fig.* 1835. The narrow-*leaved* Oak. Leaves oblong, lanceolate; acute at each end; shining above, glaucous beneath. Catkins axillary, terminal, elongated. Cups flattish, rough with small scales. Nuts roundish-ovate. A large spreading tree, 80 ft. high, with compact wood. Common in the mountains of Gedé, at elevations of 4000 ft. and 5000 ft. (*Blume.*) A most desirable species, which would probably prove hardy in the climate of London.

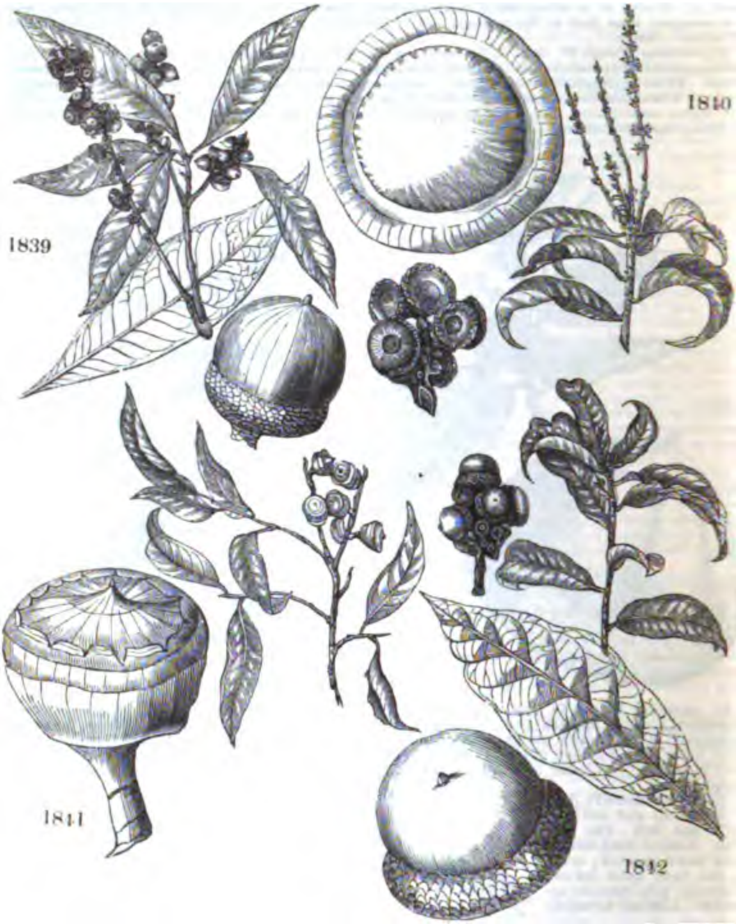
Q. pállida Blume Fl. Jav., t. 4. and 5.; and our *figs.* 1837. and 1838. The pale Oak. Leaves oval-oblong, very much pointed; acute at the base, quite entire; glabrous; pale-coloured beneath. Catkins terminal, diœcious; the male catkins branched, fastigiate; the female ones simple. A tree, from 50 ft. to 60 ft. high; flowering in June and July. Found by Blume near the sources of the river Tji-barrum, in the mountains of Gedé. (*Blume.*)


1837


1838

Q. élegans Blume Fl. Jav., t. 10.; and our *fig.* 1839. The elegant Oak. Leaves obovate, or oval-oblong, bluntly acuminate, narrowed into the petiole, glabrous. Fruit in long spikes. A magnificent tree, with a thick trunk, frequently attaining the height of 60 ft. A native of the woods of the province of Bantam, and in mountainous places. (*Blume.*)

Q. placentària Blume Fl. Jav., t. 9.; and our *fig.* 1840. The placenta-*cupped* Oak. Leaves ovate-oblong, bluntly acuminate; roundish at the base; coriaceous, glabrous. Fruit in clusters. Cup covered with small tubercles. Nuts roundish, depressed. A tree, about 40 ft. high, found on the volcanic mountain of Gedé, at an elevation of 6000 ft. The wood is rarely used, although very hard, and capable of taking a fine polish. (*Blume.*) This species would probably bear the climate of London.



Q. glabérrima Blume Fl. Jav., t. 8. ; and our *fig.* 1842. The smoothest-*leaved* Oak. Leaves elliptic-oblong, bluntly acuminate; obtuse at the base; very glabrous. Fruit in dense oval or roundish spikes. A beautiful tree, from 25 ft. to 30 ft. high, with leaves from 4 in. to 7 in. long, and from 1½ in. to 3 in. broad. It is found upon the volcanic mountain of Gedé, as well as on those surrounding it, at elevations of 4000 ft. or 5000 ft. It is somewhat allied to *Q.* squamàta *Smith* ; which, however, has the spikes much more elongated. (*Blume.*) This appears also a desirable species for introduction.

Q. costàta Blume Fl. Jav. t. 13, 14. ; and our *figs.* 1841. 1843. The ribbed-*cupped* Oak. Leaves oblong, acuminate; acute at the base; glabrous; glaucous beneath. Catkins branched. Fruit peduncled. Nuts flat above, round beneath, immersed in the cup. Cups without teeth, surrounded by circular ribs. A tree, 70 ft. high, found in mountainous places. It is easily distinguished from all the others by the singular form of its cup.

Q. rotundàta Blume Fl. Jav., t. 11. ; and our *fig.* 1844. The round-*fruited* Oak. Leaves oblong, acuminate; attenuated at the base; glabrous; glaucous beneath. Fruit in short one-sided spikes. Cups hemispherical, scaly at the margin, but without teeth at the base. Nuts plano-convex on their upper part, rounded beneath. A tree, 70 ft. high, with compact heavy wood. It is found on high mountains, and flowers in August. (*Blume.*)

Q. platycárpa Blume Fl. Jav., t. 15. ; and our *fig.* 1846. The broad-fruited Oak. Leaves oval-oblong, acute; somewhat wedge-shaped at the base; glabrous; shining above, glaucous beneath. Fruit peduncled, in short spikes. Cups surrounded beneath by hollow rings. Nuts round, depressed. A large tree, a native of the woods in the south of the province of Bantam. (*Blume.*)

Q. daphnöidea Blume Fl. Jav., t. 16. ; and our *fig.* 1845. The Daphne-like Oak. Leaves oblong-lanceolate; sharp at both ends, quite entire, smooth; somewhat glaucous beneath. Fruit in long slender catkins, almost solitary. Cups surrounded by concentric rows of tubercles. Nuts ovate, sharp-pointed. A tall tree, a native of Bantam. (*Blume.*)

Q. racemòsa W. Jack. Hook. Comp. Bot. Mag. 1. p. 255. ; Punning Punning Bunkars, *Malay*. Leaves broad lanceolate, quite entire; glabrous. Male spikes panicled. Fruit spiked. Nut umbili-

1843



1844



cate, depressed. Cup tuberculated. A large tree, with brownish bark; a native of Sumatra. Branches smooth. Leaves alternate, short-petioled, acuminate, attenuated to the petiole; nerves well marked, and reddish beneath, 6 in. to 8. in. long. Stipules small, linear. Male spikes numerous panicled, terminal; and, from the axils of the upper leaves, which are crowded round the thickened extremity of the branch, slender, hoary; flowers sessile, aggregated. Female spikes at first terminal, becoming afterwards lateral by the shooting up of the branch: flowers numerous, dense, sessile. Males: calyx 6-parted, segments acute; stamens 15—20. The centre of the flower is occupied by a densely villous disk. Female: calyx rugose, turbinate, umbilicate; ovary 3-5 celled; each cell con-

1845





1846

taining 2 ovula, attached by a thread to its summit. Acorns large, depressed, umbilicate, with a short mucro. Cup flat, embracing the nut for about half its height; nearly 1 in. in diameter; rough, with angular imbricated tubercles, which are large towards the base, and become small towards

the edge. This is a very splendid species, from the great size of its racemes and acorns. Punning Punning is the generic appellation of the oak in Malay: in the Rajang dialect it is called Pasang.

Q. *gemelliflòra* Blume Fl. Jav., t. 17. ; and our *fig.* 1847. The twin-flowered Oak. Leaves oblong-lanceolate, sharp at both ends, remotely serrated, glabrous; glaucous beneath. Female peduncles generally 2-flowered. A middle-sized tree, a native of the lofty mountains of Salak and Kandang. The wood is very compact, and excellent for building purposes. (*Blume.*)

1847



1848



Q. *indùta* Blume Fl. Jav., t. 12. ; and our *fig.* 1848. The cloth-*cupped* Oak. Leaves oval-oblong, acuminate; acute at the base; glabrous; downy beneath. Cups tubercled, without teeth. Nuts depressed and hemispherical. A handsome tree, 100 ft. high, found on Mount Gedé. (*Blume.*)

Q. *urceolàris* W. Jack. Hook. Comp. Bot. Mag., i. p. 256. Leaves elliptic-oblong, long and slender at the point, quite entire, glabrous. Fruit spiked. Cup somewhat hemispherical, with a spreading limb. A tree, with rough bark, a native of Sumatra. Leaves alternate, petiolate, terminated by a long slender acumen; coriaceous, pale beneath; 8 in. to 9 in. long. Fruit on lateral racemes. Acorns rounded and flattened at top; umbilicate in the centre, and mucronate with the three persistent styles; rather perpendicular at the sides, half-embraced by the calyx, which is cup-shaped, marked on the outer surface with small acute scaly points, concentrically arranged, and whose margin expands into a spreading, nearly entire, waved limb. The ovary is three-celled, each cell containing two ovula, and is lodged in the bottom of the large funnel-shaped calyx. The acorn contains a single exalbuminous seed, placed a little obliquely. The spreading limb of the cups forms a good distinctive character, and renders this a very remarkable and curious species.

Q. *Pseùdo-molùcca* Blume Fl. Jav., t. 6. ; and our *fig.* 1849. The false Molucca Oak. Leaves elliptic-oblong, acuminate; acute at the base; glabrous; shining above, glaucous beneath. Catkins almost terminal. Cups not much hollowed, covered with small scales. Nuts hemispherical. A very branchy tree, found in the forests of the west of Java. (*Blume.*)

1849



Q. *molùcca* Lin. Sp. Pl., 1412., Willd., No. 11., Rumph. Amb., 3. p. 85., N. Du Ham, 7. p. 153., Smith in Rees's Cyclo., No. 11. The Molucca Oak. Leaves elliptic-lanceolate, entire, acute at each end, smooth. Nut roundish, furrowed. (*Smith.*) "Native of the Molucca Isles. A large and lofty tree, the wood of which is hard and heavy; lasting long under water. Leaves 6 in. or 8 in. long, and 3 in. broad, on short stalks, with 8 or 10 irregular lateral veins. Acorns short and roundish, furrowed in their upper part; the cup short, warty. By Rumphius's account, there seem to be more species than one comprehended under the chapter above cited; but he does not give us sufficient marks to define them specifically." (*Smith* in *Rees's Cycl.*)

Q. *turbinàta* Blume Fl. Jav., t. 18. ; and our *fig.* 1850. The top-shaped-*cupped* Oak. Leaves oblong-lanceolate, sharp at both ends, sharply serrated towards the apex, glabrous. Cups top-shaped. A



1850

handsome tree, from 40 ft. to 50 ft. high; found on the mountain of Salak. It is nearly allied to *Q. glaúca Thunb.*; but the leaves are broader, less acute at the base, and not glaucous beneath. (*Blume.*) The acorns are of a very singular shape, and are enclosed in the cup.

Q. lineàta Blume Fl. Jav., t. 19.; and our *fig.* 1851. The parallel-veined Oak. Leaves oblong-lanceolate, sharp at both ends, serrated or entire; glabrous above, glaucous and downy beneath. Nuts small, scarcely reaching a line above the cup; crowned at the tip by a long umbo. A large tree, attaining the height of 80 ft. and upwards. A native of the west of Java, in woods, at elevations of 5000 ft. to 6000 ft. (*Blume.*)



1851

App. viii. *Mexican Oaks not yet introduced.*

The first 22 of the following oaks are described and figured in Humboldt and Bonpland's magnificent work on the plants of Mexico, entitled *Plantæ Æquinoctiales*. The 14 that follow these are taken from Nees, as quoted in *Rees's Cyclopædia*; and many of them are probably indentical with those of Humboldt.

Q. xalapénsis Humb. et Bonp. Pl. Æquin., t. 75., and our *fig.* 1852., Michx. N. Amer. Syl., 1. p. 109.; Roble de Duela, *Span.* Leaves on long footstalks, oval-lanceolate; acute at each end, remotely toothed with bristly teeth, quite glabrous. Fruit almost solitary, sessile. (*Humb. et Bonp.*) A tall tree, glabrous in every part, except the cup. Branches alternate; younger ones covered with round tubercles. Leaves crowded towards the tips of the branches, 3 in. to 4 in. long, somewhat leathery. Petioles 1 in. or 1½ in. long; a little thickened towards the base, slender. Female flowers axillary, almost solitary and sessile. Cup goblet-shaped, closely imbricated. Scales oval, membranaceous; covered on the outside with a peculiar down, scarious on their margins, and blunt at their apex. Nut ovate, obtuse, terminated by the persistent style. Very common in the forests near Xalapa, in New Spain, at an elevation of about 4000 ft. (677 toises). From the wood, which much resembles that of *Q. Ròbur*, the Spaniards have given it the name of *Roble de Duela*, that is, the Timber Oak; a name which indicates that this oak is applied to the same uses as *Q. Ròbur*. This is a valuable tree, and it will one day become of such great importance in Mexico, that the inhabitants ought to take more pains to increase it. Michaux describes it as a very lofty tree, with a trunk 2 ft. in diameter. It bears abundance of acorns, which, though they soon germinate, might, with proper care [packed in moist Sphágnum], be sent to England.



1852



1853

Q. glaucéscens Humb. et. Bonp. Pl. Æquin., t. 78., and our *fig.* 1853., Michx. N. Amer. Syl., p. 111. Leaves on short footstalks, wedge-shaped, obovate; entire at the base; slightly repand and

toothed towards the top; glaucous, and quite glabrous. Fruit racemose. (*Humb. et Bonp.*) A very tall straight tree, quite glabrous; younger branches angular. Leaves 3 in. to 4 in. long, membranaceous. Petioles about ¼ in. long, thickish. Male flowers beneath the female, in aggregate axillary catkins. Female racemes axillary. Flowers sessile. Male flower: calyx bell-shaped, hairy on the outside limb unequally dentate; stamens 5 to 8.; anthers 2-celled, erect, opening longitudinally. Female flower: ovary globose, small; style 1, very short; stigmas 3, spreading, thickish. A native of the warm parts of Mexico, between La Venta de la Mojonera and La Venta de Acaguisocla; where it forms forests, at an elevation of above 2300 ft. (397 toises) above the level of the sea. The wood is of great value to the inhabitants, from its supplying the greatest part of the charcoal consumed in Mexico.

Q. obtusàta Humb. et Bonp. Pl. Æquin., t. 76., and our *fig.* 1854., Michx. N. Amer. Syl., 1. p. 112. Leaves oblong; blunt at each end, unequal at the base, wavy at the margin, very veiny beneath, and somewhat downy. Fruit racemose (*Humb. et Bonp.*) A native of New Spain, near Ario, at an elevation of about 6000 ft. (994 toises). A lofty tree, with a trunk from 3 ft. to 4 ft. in diameter, covered with a very thick deeply cracked bark. Branches covered with tubercles; younger ones leafy, downy. Leaves from 5 in. to 6 in. long, leathery, glabrous and shining above. Petioles ½ in. long. Cups somewhat globose. Scales closely imbricated. Nut spherical, nearly covered by the cup. This oak is called *Q.* obtusàta, because the base, the tip, and the divisions of the leaves are blunt, and without any point. The wood is very compact, susceptible of taking a fine polish, and of resisting a great force. The tree is remarkable for its height, the thickness of its trunk, the glaucous colour of the scales of the cup, and, above all, by the scales being imbricated the contrary way; that is to say, the point of each scale is turned towards the peduncle. This and *Q.* lanceolàta are the only Mexican species that are known to have all the scales in the cup of the acorn imbricated from the nut to the peduncle. According to Michaux, this species is very tall, with a remarkably straight trunk; and is found in the elevated and dry parts of New Spain, near Ario, where it flowers in September.



1854

Q. panduràta Humb. et Bonp. Pl. Æquin., t. 77., and our *figs.* 1855. and 1856., Michx. N. Amer. Syl., 1. p. 111. Leaves oval-oblong, somewhat fiddle-shaped; acute at the point, unequally cordate at the base, wavy and slightly sinuate on the margin, downy beneath. Fruit racemose. (*Humb. et Bonp.*) Found in the same habitat as the preceding. A tree, from 18 ft. to 24 ft. high. Branches alternate, glabrous; the younger ones covered with short hairs, visible to the naked eye. Leaves alternate, from 3 in. to 5 in. long; glabrous above, downy beneath. Petioles 1 in. long. Scales of the cup closely imbricated, externally convex, glaucous. Nut ovate, half-covered by the cup. This oak is closely allied to *Q.* obtusàta, but differs in size, in the form of the leaves, and the disposition of the scales of the cup. Humboldt is of opinion that the wood is lighter, and less compact, than that of *Q.* obtusàta.



1855



1856

Q. repánda Humb. et Bonp. Pl. Æquin., t. 79., and our *fig.* 1857., Michx. N. Am. Syl., 1. p. 108. Leaves oblong-oval, on short footstalks; downy beneath, glabrous above; slightly repand; recurved at the margin. Fruit racemose. (*Humb. et Bonp.*) A shrub, 2 ft. high, branched from the very base, procumbent or erect. Branches alternate, round, quite smooth; younger ones covered with white down. Leaves 1½ in. long, leathery; younger ones lanceolate, downy on both sides, quite entire. Stipules linear awl-shaped, persistent, downy. Male flowers inferior, in aggregate axillary catkins. Female flowers superior, axillary, and sessile. Male flower: calyx campanulate, limb unequally dentate; stamens 5 to 7, three times as long as the calyx, erect. A native of New Spain, in moist shady places, between Real del Monte and Moran, at an elevation of above 7700 ft. (1291 toises). It is the smallest of all the species of oak in Mexico, forming extended masses, and having the branches of one interlaced with those of another. The young shoots of *Q.* repánda agree with the description of *Q.* microphýlla given by Nees in the *Anales de las Cienc. Nat.*, iii. p. 264.; but Humboldt had not seen Nees's plant, and, therefore, could not determine whether they were the same.

Q. laurìna Humb. et Bonp. Pl. Æquin., t. 80., and our *fig.* 1858., Michx. N. Amer. Syl., 1. p. 108. Leaves oval-lanceolate, sharply acuminated, quite glabrous: some area little 3-pointed at the tip. Fruit axillary, almost sessile. (*Humb. et Bonp.*) A tall tree, with the habit of *Laúrus* nóbilis, glabrous in all parts. Leaves 2 in. to 3 in. long, leathery. Petioles about ¼ in. in length. Female flowers axillary, almost sessile, and solitary. Scales of the cup ovate, obtuse, membranaceous, covered externally with a peculiar down, like powder. A native of the woods in the temperate parts



1857



1858

of New Spain, near Moran. It was only found by Humboldt on the mountain Cerro de las Nahajas, at an elevation of 4800 ft. (800 toises). It is on this mountain that the stones (obsidians) are found, in great quantities, of which the Mexican Indians make the heads of their arrows; and they are said, also, to make razors and knives of them. The wood is very hard, and much esteemed by the Mexicans.

Q. sideróxyla Humb. et Bonp. Pl. Æquin., t. 85., and our *fig.* 1860., Michx. N. Amer. Syl., 1. p. 109. Leaves wedge-shaped, oblong; obtuse at the base; mucronate and dentate towards the tip; white with down beneath. Fruit sessile. (*Humb. et Bonp.*) A lofty tree, with thick rugged bark, and very hard wood. Leaves crowded, on short footstalks; 1½ in. long, rigidly coriaceous; glabrous above. Female flowers generally twin, upon very short footstalks, in the axils of the leaves. Cups globose, closely imbricated. Scales membranaceous, roundish-oval, obtuse; covered externally with powdery down; scarious and naked on the margin. Nut ovate, twice as long as the cup. A native of the temperate regions of New Spain, near Villalpando, in dry and arid places, at an elevation of 8600 ft. (1440 toises). This is one of the most valuable species of oaks furnished by New Spain. It attains a great height; its wood is very compact, and capable of taking a fine polish; and it has another property, as rare as valuable, viz. that of hardening when exposed to moisture, or entirely plunged in water, and never decaying in such a situation. For this reason, it is preferred for subterraneous works, by the miners, to every other.



1859



1860

Q. mexicàna Humb. et Bonp. Pl. Æquin., t. 82., and our *fig.* 1861., Michx. N. Amer. Syl., 1. p. 107. Leaves oblong, blunt, with a very minute point; somewhat wavy on the margin; downy beneath. Acorns slightly stipitate. A tree, from 18 ft. to 20 ft. high. Younger branches downy. Leaves about 2 in. long; white beneath with stellate down, glaucous above, shining, leathery; younger ones lanceolate, downy on both sides, quite entire. Male flowers inferior, in axillary aggregate catkins; female nearly sessile, in the axils of the leaves, almost solitary. Male flower: one concave roundish scale, instead of a calyx; stamens constantly 7, very short. Cup goblet-shaped. Scales oval, obtuse, flat, membranaceous; covered externally with a powder-like down. Nut ovate, terminated by the persistent style. Very common in Mexico. The wood is white, and neither strong nor compact; but it is much sought after for making charcoal. The young leaves have all the characters of *Q.* microphylla. (*Nees.*)

Q. crássipes angustifòlia Humb. et Bonp. Pl. Æquin., t. 84., and our *fig.* 1859., differs from *Q.* crássipes, in the leaves being narrowed, and more diminished towards the point. Found, along with *Q.* crássipes, near Ario, in the interior of Valladolid.

Q. crássipes Humb. et Bonp. Pl. Æquin., t. 83., and our *fig.* 1862., Michx. N. Amer. Syl., 1.

1861





1862

p. 107. Leaves somewhat lanceolate-oblong; obtuse at the base, quite entire; downy beneath. Fruit on short thick stalks. (*Humb. et Bonp.*) A tree, from 25 ft. to 30 ft. high. Branches round, covered with minute tubercles; younger ones somewhat hairy. Leaves about 2 in. long, leathery; glabrous above; covered with pale down beneath. Petioles about 2 lines long. Female flowers in the axils of the leaves, almost solitary, on short thick pedicels. Cups somewhat top-shaped, closely imbricated. Scales oval, covered externally with a powdery down, acute. Nut ovate, terminated by the elongated style. A native of the low mountains of New Spain, near Santa Rosa. Humboldt called this species *Q. crássipes*, from the extreme thickness and shortness of the stalks of the acorns. Its leaves terminate in a mucro.

Q. lanceoláta Humb. et Bonp. Pl. Æquin., t. 81., and our *fig.* 1863., Michx. N. Amer. Syl., 1. p. 107. Leaves lanceolate, quite entire, wavy; the axils of the veins bearded beneath; shining above. Fruit sessile. Scales of the cup turned backwards. (*Humb. et Bonp.*) A tree, from 30 ft. to 40 ft. high. Branches alternate, covered with small tubercles, glabrous; younger ones, and the petioles, clothed with stellate down. Leaves 2 in. to 3 in. long, and 1 in. broad; shining on both sides, leathery. Petioles about ½ in. long. Female flowers axillary, nearly sessile, and solitary. The cup is in the shape of a goblet, with the scales turned the contrary way; oval, glabrous, and convex on the outside. Nut ovate, twice the length of the cup. A native of the temperate regions of New Spain, between Moran and Santa Rosa; where it forms immense forests, at an elevation of 5400 ft. (900 toises). The wood is very hard, and will last a long time when driven into the earth, or exposed to wet; on which account it is much esteemed by the Mexicans, and is used in the works of the mines. This oak is remarkable for its leaves, which are entire and wavy on the margin; for the goblet-shaped cups of its acorns, the scales of which all point towards the tree, instead of from it; and the property which is possessed by its wood of resisting decay in water.

1863



Q. reticuláta Humb. et Bonp. Pl. Æquin., t. 86., and our *fig.* 1865., Michx. N. Amer. Syl., 1. p. 110. Leaves obovate; emarginate at the base; slightly toothed towards the tip, rugged; reticulately veined and minutely downy beneath. Fruit sessile, on a pedunculated raceme. (*Humb. et Bonp.*) A very lofty tree; younger branches downy. Leaves 2 in. long, a little emarginate at the base. Female flowers in axillary solitary spikes, about the length of the leaves Cup campanulate, closely imbricate. Scales membranaceous, lanceolate, externally downy, attenuated on both margins, somewhat recurved. Nut ovate, twice as long as the cup; terminated by the persistent style. A native of arid mountains in New Spain, between Guanajuato and Santa Rosa, forming considerable forests, at an elevation of about 6700 ft. (1450 toises). It attains a great height, and the trunk is straight, and of great diameter. The wood is used in building.

Q. chrysophýlla Humb. et Bonp. Pl. Æquin., t. 87., and our *fig.* 1864., Michx. N. Amer. Syl., 1. p. 108. Leaves oblong; obtuse at the base; 3—5-pointed at the apex; yellow beneath. Female flowers in many-flowered pedunculated clusters. (*Humb. et Bonp.*) A tall tree; younger branches furrowed, as if with a powdery down. Leaves alternate, on long footstalks, 2 in. long, membranaceous; shining

above, covered with fine yellow tomentum beneath. Male catkins aggregate, situated beneath the female flowers. Male flower: calyx 5-toothed, stamens 6, anthers ovate, pollen yellow. Female flowers 4–6, sessile, on the apex of a peduncle about ¾ in. long. Female flower: ovary globose; styles or stigmas 5, red, thick. A native of New Spain, between Moran and Pachuca. *Q.* chrysophylla, as well as the preceding species, is found forming entire forests between Moran and Pa-



1864



1865

chuca, at an elevation of 8400 ft. (1400 toises). It is remarkable, on account of the position of its female flowers, which are placed under the male flowers; and also for the beautiful golden colour of the under surface of the leaves; a peculiarity which distinguishes it from every other described species of oak. Michaux mentions that this tree is remarkable for the thinness of its foliage.

Q. pulchélla Humb. et Bonp. Pl. Æquin., t. 88., and our *fig.* 1866., Michx. N. Amer. Syl., 1. p. 110. Leaves oblong, obtuse; emarginate at the base; covered with white down beneath; teeth short, mucronate. Fruit sessile, almost solitary. (*Humb. et Bonp.*) A shrub from 12 ft. to 18 ft. high, with a trunk about 2 ft. in circumference, and a smooth bark. Branches alternate, round, covered with tubercles, or callous dots. Leaves crowded towards the tips of the branches; 1½ in. to 2 in. long, on longish footstalks, leathery, wavy on the margin; shining above, reticulately veined and covered with white down beneath. Female flowers axillary, solitary, or twin. Cup spherical. Scales roundish-oval, closely imbricated; externally downy on the back, membranaceous. Nut ovate, scarcely longer than the cup. A native of the mountainous region of New Spain, between Guanajuato and Santa Rosa, at an elevation of 8400 ft., (1400 toises). It has considerable affinity with *Q.* siderόxyla (p. 1943.); but it differs in its height and habit of growth; in the form and consistency of its leaves; in their being cut in their petioles, and, lastly, in the size of its fruit, which are larger than in *Q.* siderόxyla.



1866



1867

Q. spicàta Humb. et Bonp. Pl. Æquin., t. 89., and our *fig.* 1867., Michx. N. Amer., 1. p. 111. Leaves elliptic or obovate, emarginate at the base, remotely toothed, downy beneath. Female spike on a long footstalk. (*Humb. et Bonp.*) A tall tree, from 30 ft. to 40 ft. high. Branches and young leaves covered with clusters of down. Leaves on short footstalks, somewhat wedge-shaped, oboval, or for the most part elliptic; roundish-obtuse; glaucous and shining above, tomentose beneath; and, in some, reticulately veined, downy. Female flowers in spikes or sessile racemes, distinct. Cup hemispherical. Scales closely imbricated, oblong, blunt, externally convex, downy. Nut ovate. A native of shady situations in the mountain of Nabajas, in Mexico, at an elevation of 9000 ft. to 9500 ft. (1487 to 1590 toises). It appears allied to *Q.* elliptica, described by Nee in the *Anales de las Ciencias Naturales*, 1801. The leaves are not entire, but are denticulated in the upper half: they are furnished with short thick footstalks, membranaceous, and not coriaceous; and, instead of being almost sessile, they are supported on long footstalks.

Q. stipulàris Humb. et Bonp. Pl. Æquin., t. 90., and our *fig.* 1868., Michx. N. Amer. Syl., 1. p. 109. Leaves oboval, sharply toothed towards the point; teeth terminated by mucros; covered on

the under surface with woolly tomentum. Stipules persistent. Fruit sessile, almost solitary. (*Humb. et Bonp.*) A tree, about 50 ft. high. Branches downy; younger ones brownish. Leaves about 3 in. long; younger ones downy above; adult ones thick and rigidly coriaceous; glabrous above, covered with yellow down beneath; obtuse and somewhat emarginate at the base, acute at the apex; distinctly toothed on the upper part. Petiole ¼ in. to ½ in. long, thick, tomentose. Stipules linear-lanceolate, persistent. Female flowers axillary, sessile, solitary or twin. Cup composed of roundish, membranaceous, downy scales. A native of the mountains of Mexico, near Actopan; forming entire forests, at an elevation of 7900 ft. (1330 toises). It has a great affinity with *Q.* magnolia*efòlia* Nee, and *Q.* lùtea *Nee* (see p. 1949.); but differs in the fruit being sessile, and disposed singly or in pairs in the axils of the leaves; while, in *Q.* magnoli*aefòlia* and *Q.* lùtea, the fruit is in racemes. It is easily known from every other species of oak by its large persistent stipules. Michaux describes it as remarkable for the thickness of its foliage.



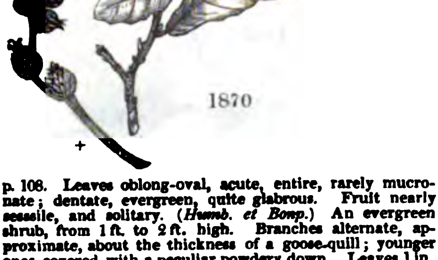
1868



1869

Q. crassifòlia Humb. et Bonp. Pl. Æquin., t. 91., and our *fig.* 1869., Michx. N. Amer. Syl., 1. p. 110. Leaves wedge-shaped, oboval; emarginate at the base, remotely toothed, repand; downy beneath. Peduncles short, bearing 1–3 acorns. (*Humb. et Bonp.*) A tree, from 40 ft. to 50 ft. high. Branches downy, angled. Leaves from 3 in. to 4 in. long, thick, and rigidly coriaceous; covered with yellow down beneath; teeth blunt, terminated by a mucro. Cups sessile on the tips of short thick peduncles. Scales roundish, downy. Nut spherical, very small, covered by the cup. A native of New Spain, near Chilpancingo. It is closely allied to *Q.* magnoli*aefòlia* and *Q.* lùtea *Nee*; which two kinds Humboldt considers as forming only one species. Michaux mentions that it has very thick heavy-looking foliage; and that it is found in stony and mountainous places.

Q. depréssa Humb. et Bonp. Pl. Æquin., t. 92., and our *fig.* 1871., Michx. N. Amer. Syl., 1.



1870



1871

p. 108. Leaves oblong-oval, acute, entire, rarely mucronate; dentate, evergreen, quite glabrous. Fruit nearly sessile, and solitary. (*Humb. et Bonp.*) An evergreen shrub, from 1 ft. to 2 ft. high. Branches alternate, approximate, about the thickness of a goose-quill; younger ones covered with a peculiar powdery down. Leaves 1 in. to 1½ in. long; glabrous on both sides, shining, rigid, on very short petioles. Catkins downy. Calyx small, 4—5-toothed, downy. Stamens 7—11, three times as long as the calyx, erect. Anthers ovate,

2-celled. Female flowers axillary, nearly solitary, sessile or on very short stalks. Scales of the cup roundish, covery with powdery down. Ovary globose. Styles 2. A native of the mountains of Mexico, in moist shady situations, and frequent near Moran, an elevation of 18,000 ft. (3000 toises); where it covers whole hills. It is remarkable for its small size, evergreen leaves, and long downy catkins of male flowers. Humbolt called it *Q.* depréssa, because its branches are always close to the ground.



1872



1873

Q. ambígua Humb. et Bonp. Pl. Æquin., t. 93., and our *fig.* 1870., Michx. N. Amer. Syl., 1. p. 111. Leaves oblong-oboval, wavy; obtuse at the base; reticulately veined beneath, somewhat hairy. Female spike pedunculated. (*Humb. et Bonp.*) A tree, 40 ft. high. Branches and twigs round, glabrous. Leaves 3 in. long, on short footstalks, somewhat membranaceous; sometimes emarginate; glabrous and shining above, green and downy beneath. Spikes of female flowers axillary, often twin, on long stalks, 5—6-flowered. Flowers downy. A native of Mexico, near Moran, at an elevation of above 9000 ft. (1500 toises.) It is closely allied to *Q.* ellíptica *Nee.* (See p. 1918.) It differs very little from *Q.* elliptica *Nee*, and *Q.* spicàta *Humb. et Bonp.*, but its leaves are narrower towards their lower extremity, slightly sinuated on the margin, glaucous, and always reticulately veined and hairy beneath; and the spikes of female flowers are generally axillary, and in pairs. Our readers must not confound this *Q.* ambígua with the one in cultivation in British gardens, described p. 1881. Doubtless, this plant, as having had the name applied to it after the other, will receive an unappropriated name from some botanist who may revise the genus.

Q. confertifòlia Humb. et Bonp. Pl. Æquin., t. 94., and our *fig.* 1872., Michx. N. Amer. Syl., 1. p. 106. Leaves evergreen, linear-lanceolate, mucronated, recurved at the margin, quite entire; downy beneath. Fruit sessile. (*Humb. et Bonp.*) An evergreen shrub, from 15 ft. to 20 ft. high. Branches short, crowded, and leafy. Leaves 3 in. long, on short stalks, somewhat leathery; obtuse at the base, surrounded with a cartilaginous recurved line; glabrous and shining above, downy and transversely veined beneath. Fruit sessile on the branches below the leaves, often twin. Scales of the cup oval, closely imbricated, membranaceous. A native of the temperate and mountainous regions of New Spain, between the town of Guanajuata and Santa Rosa. This evergreen shrub, or low tree, would be a great ornament to our gardens, where it would form constantly green and thick masses of foliage; and, from the temperate and mountainous climate of which it is a native, it would probably stand in the open air perfectly well in the climate of London.

Q. trìdens Humb. et Bonp. Pl. Æquin., t. 96., and our *fig.* 1873., Michx. N. Amer. Syl., 1. p. 107. Leaves oblong, retuse at the base, generally broader towards the apex, 3-dentate; teeth terminated by bristly points; downy beneath. Spikes of female flowers almost sessile. (*Humb. et Bonp.*) A shrub, about 10 ft. high, with round smooth branches. Stipules deciduous, narrow, linear. Leaves about 1½ in. long, membranaceous; downy and slightly tomentose beneath, covered with stellate down above, sometimes entire; narrowed towards the base. Male flower: calyx 6—7-parted, stamens 8. Spikes of female flowers axillary, almost sessile, 3—5-flowered. A native of New Spain, and common in the vicinity of Moran. The name *Q.* tridens has been applied to this species, from the circumstance of the leaves being almost constantly furnished with 3 teeth at the apex, although otherwise entire. It is found at an elevation of 7800 ft. (1300 toises.) F. A. Michaux mentions that it is sometimes found 20 ft. high.



1874

Q. acutifòlia Willd., No. 57., Nee in Anal. Cien. Nat., 3. p. 267., Fisch. Misc. Hisp., 1. p. 102., N. Du Ham., 7. p. 173., Smith in Rees's Cycl., No. 64., Humb. et Bonp. Pl. Æquin., t. 95., and our *fig.* 1874.; Michx. N. Amer. Syl., 1. p. 109. Leaves cordate, lanceolate, very finely pointed; beset on the margin with large mucronate teeth; brownish beneath; tomentose near the veins. Spikes of female flowers on short peduncles. (*Humb. et Bonp.*) A tall and valuable tree, with a trunk about the thickness of a man's body, covered with cracked bark. Leaves on longish footstalks, blunt; somewhat lobed at the base; glabrous above; covered beneath with brown woolly tomentum; 5 in. to 6 in. long, and 1 in. to 2 in. broad. Calyx of the male flowers constantly 5-toothed, externally downy. Stamens 5—7, twice as long as the calyx. Female flowers in a spike, upon a short

peduncle. Calyx 5—8-parted. Ovary globose. Style very short. Stigmas 3—4, spreading and recurved. A native of New Spain, between Venta de Acagulsocia and Mojonera, on the road from Acapulco to Mexico. Nee states that it is considered one of the largest oaks in New Spain; and that it has a dense head of innumerable branches. The acorns are scarcely bigger than a pea, and nearly covered by the cup, which is clothed with blackish scales. (*Nee*, as quoted in *Rees's Cycl.*) Humboldt calls it one of the most majestic trees of New Spain; and it is as remarkable for the beauty and singularity of its leaves, as it is for the grandeur and nobleness of its general appearance.

Q. ellíptica Willd., No. 14., Nee in Anal. Cien. Nat., 3. p. 278., Fisch. Misc. Hisp., 1. p. 117., N. Du Ham., 7. p. 154., Smith in Rees's Cycl., No. 16. Leaves elliptical, entire, coriaceous, nearly sessile; rounded at each end; roughish beneath. (*Willd.*) Gathered by Louis Nee, but without flowers or fruit, in the kingdom of Mexico, by the road from Ixmiquilpan to Cimapan, as well as between Tixtala and the river Azul. The trunk is thick, 12 ft. high, with a grey bark. Branches horizontal; the smaller shoots erect; all very leafy. Leaves 3 in. long, and 1 in. broad; slightly revolute; smooth above, roughish and veiny beneath; the veins forked. Footstalks thick, and very short. (*Nee*, as quoted in *Rees's Cycl.*) Humboldt considers this species as allied to his *Q. spicàta* (p. 1945.) and *Q. ambígua* (p. 1947.); but differing from both principally in the leaves.

Q. mucronàta Willd., No. 34., N. Du Ham., 7. p. 162., Smith in Rees's Cycl., No. 41; *Q. Castànea* *Nee* in *Anal. Cien. Nat.*, 3. p. 276., *Fisch. Misc. Hisp.*, 1. p. 114. Leaves oblong, lanceolate, with pointed awned serratures; polished above, downy beneath; heart-shaped at the base. (*Willd.*) Found by Louis Nee, without flowers or fruit, in New Spain, between Ixmiquilpan and Cimapan. This tree is 12 ft. high, with a straight trunk, covered with a brittle dark-coloured bark. Branches erect, alternate, smooth, much subdivided. Leaves 3 in. long, and 1 in. broad, acute; abrupt and heart-shaped at the base; their serratures awned; the upper surface green and smooth, the under clothed with fine yellow down. Footstalks 2 lines long. Stipules none. (*Nee*, as quoted in *Rees's Cycl.*)

Q. tomentòsa Willd., No. 35., N. Du Ham., 7. p. 163., Smith in Rees's Cycl., No. 42; *Q. pedunculàris* *Nee* in *Anal. Cien. Nat.*, 3. p. 270., *Fisch. Misc. Hisp.*, 1. p. 106. Leaves oblong-ovate, with tooth-like notches; densely downy beneath. Fruit racemose. Nut globose, nearly covered by the calyx. (*Willd.*) Native of New Spain, in the road from Mexico to Acapulco, beyond the river Mescala. A tree, 20 ft. high, with an upright trunk, and grey brittle bark. Branches numerous, alternate, clothed with dense reddish wool. Leaves 5 in. long, hardly 2 in. wide, crowded; obtuse at the base; pointed at the end; bordered with tooth-like notches; green and smoothish above, downy with prominent veins beneath. Footstalks downy, very short. Female flowers on an axillary solitary stalk, 3 in. or 4 in. long. Acorns but little bigger than peppercorns, each almost concealed in its scaly, downy, reddish cup. (*Nee.*)

Q. circinàta Willd., No. 36., Nee in An. Cien. Nat., 3. p. 272., Fisch. Misc. Hisp., 1. p. 109., N. Du Ham., 7. p. 168., Smith in Rees's Cycl., No. 43. Leaves ovate, crenate, undulated; acute at each end; downy beneath. Nut scarcely larger than the calyx. (*Willd.*) Native of New Spain, between Tintala and Chilpancingo. A tree, 20 ft. or 25 ft. high. Trunk erect. Bark brittle, ash-coloured. Branches horizontal; the young ones erect, furrowed, villous. Leaves alternate, from 5 in. to 7 in. long, and 3 in. broad; green and shining above; more or less downy, and flesh-coloured or reddish brown, beneath; their edges turned towards the point of the leaf. Fruit supported by a very short common stalk. Calyx hemispherical, the size of chick peas (*Cicer arietinum*); its scales acute at the point. Nut but little larger than the calyx. Plukenet's t. 53. f. 4. in some measure resembles the species before us; but is said to have a large fruit, and is quoted by authors as *Q. Prinus*. (*Nee*, as quoted in *Rees's Cycl.*)

Q. splèndens Willd. No. 37., Nee in An. Cien. Nat., 3. p. 275., Fisch. Misc. Hisp., 1. p. 113., N. Du Ham., 7. p. 164., Rees's Cycl., No. 44. Leaves oblong-ovate, bluntly toothed; slightly downy above; densely silky beneath. (*Willd.*) Native of New Spain, near Taxala. Trunk erect, much branched, 15 ft. high. Branches partly horizontal, partly erect, clothed with red shining down. Leaves scattered, crowded, 3 in. long, 1 in. broad; green, with a thin downy coat, above; thickly clothed beneath with shining pubescence, the midrib only being prominent; the edges bluntly and unequally toothed. Footstalks very short, with an awl-shaped villous stipule at each side. Flowers and fruit not observed. (*Nee*, as quoted in *Rees's Cycl.*)

Q. rugòsa Willd., No. 38., Nee in An. Cien. Nat., 3. p. 275., Fisch. Misc. Hisp., N. Du Ham., 7. p. 164., Rees's Cycl., No. 45. Leaves ovate-oblong, coriaceous, rugose; toothed towards the end; heart-shaped at the base; downy and rusty beneath. (*Willd.*) Native of the woods of Huitquilica and Ociula, in the way from Mexico to Santo Christo de Chalma. A middle-sized tree, having numerous, alternate, round, grey branches, rough with minute prominent points. Leaves 3 in. in length, hardly 2 in. in breadth; thick and coriaceous; rugged, green, and shining on the upper side; brown and downy at the back; heart-shaped at the base; the margin toothed from the middle to the extremity. Footstalks 2 lines long, thickened at their base. Female flowers in scaly axillary clusters. (*Nee*, as quoted in *Rees's Cycl.*)

Q. macrophýlla Willd., No. 39., Nee in An. Cien., Nat., 3. p. 274. Fisch. Misc. Hisp., 1. p. 111., N. Du Ham., 7. p. 164., Rees's Cycl., No. 46. Leaves obovate, crenate; tapering and heart-shaped at the base; downy beneath. Fruit spiked. (*Willd.*) Found by Louis Nee in the districts of Chilpancingo and La Curva, and on the mountain of Quirapon, in New Spain. This is a tree, 30 ft. high, with an upright trunk, and dense head. The principal branches are horizontal; the rest upright, furrowed when young. Leaves 1 ft. long, and 7 in. or 8 in. broad; rounded at the end, gradually tapering down to the emarginate, or heart-shaped, base, where they measure only 4 lines across; their upper surface green and shining; the under yellowish, clothed with very minute down; the margin crenate and wavy. Footstalks very short and thick. Female flowers sessile on a common stalk, and encompassed with downy bracteas. (*Nee*, as quoted in *Rees's Cycl.*)

Q. diversifòlia Willd., No. 21., Nee in An. de las Cien. Nat., 3. p. 270., N. Du Ham., 7. p. 155., Rees's Cycl., No. 28., Fisch. Misc. Hisp., 2. p. 107. Leaves ovate, undivided or deeply toothed; yellow and downy beneath. Fruit spiked, globose. (*Smith.*) Found by Louis Nee between the villages of Chalma and Santa Rosa, in New Spain. A shrub, from 10 ft. to 14 ft. high; its trunk seldom straight; the bark cracked, dark-coloured; the branches alternate. Leaves 1½ in. long and undivided or 2½ in., and deeply toothed; smooth and shining above; downy and dull yellow beneath. Footstalks hardly a line in length. Stipules oblong, reddish, membranous, contracted at the base, deciduous. Acorns 4 or 5, sessile, on a thread-shaped axillary stalk, 2 in. long. Cup the size and shape of a pea, covered with scales. Nuts scarcely projecting above a line beyond the cup. (*Nee.*)

Q. cándicans Willd., No. 58., Nee in An. de las Cien. Nat., 3. p. 277., Fisch. Misc. Hisp., 1. p. 115., N. Du Ham., 7. p. 173., Smith in Rees's Cycl., No. 65. Leaves ovate, sinuated; white and downy beneath; lobes toothed, bristle-pointed. (*Willd.*) Native of New Spain, in sandy ground near Tixtala. A tree of middling size, with a dense head of upright branches. Leaves 9 in. long, 4 in. wide; tapering at each end, sinuated, with bristle-pointed teeth; green and smooth above; white and downy underneath. Footstalks 4 lines in length. Flowers and fruit not observed. (*Nee*, as quoted in *Rees's Cycl.*)

Q. *microphýlla* Willd., No. 7., Nee in An. Cien. Nat., 3. p. 264., Fisch. Misc. Hisp., 1. p. 99., N. Du Ham., 7. p. 152., Rees's Cycl., No. 7. Leaves lanceolate, pointed, entire, villous; downy beneath. Calyx of the fruit villous. Nut roundish. (*Willd.*) Found by Louis Nee in the hills of Arambaro, in New Spain. A shrub, from 3 ft. to 5 ft. high, with a rough ash-coloured bark. Leaves on short stalks, scattered, numerous, from 4 to 6 lines long, scarcely 2 lines broad; veiny, revolute, wavy, pointed, reddish grey; villous above, densely downy beneath; those about the extremities of the branches opposite. Stipules awl-shaped, falling off at the end of summer. Acorns in axillary pairs about the ends of the branches, ovate, the size of a large pea, half-covered by the villous cup, which is invested with unequal sides. (*Nee*, as quoted in *Rees's Cycl.*) Humboldt compares the young leaves of his *Q.* mexicàna to this species. (See p. 1943.) He also states that the young shoots of *Q.* repánda (p. 1942.) agree with the description of those of *Q.* microphýlla; but he adds that he had not seen Nee's plant.

Q. *lobàta* Willd., No. 70., Nee in Ann. Cien. Nat., 3. p. 237., Fisch. Misc. Hisp., 1. p. 116., N. Du Ham., 7. p. 180., Rees's Cycl., No. 76. Leaves obovate, wedge-shaped, sinuated, smooth; lobes toothed. (*Willd.*) Native of New Spain. Branches furrowed, alternate. Leaves 4 in. long, 2½ in. wide, smooth, alternate; orbicular towards the extremity; wedge-shaped at the lower part; sinuated; the lobes rounded, obtuse, toothed. Footstalks slender, 3 or 4 lines in length. (*Nee*, as quoted in *Rees's Cycl.*)

Q. *magnoliæfòlia* *Willd.*, No. 16., *Nee* in *An. Cien. Nat.*, 3. p. 268., *Fisch. Misc. Hisp.*, 1. p. 103., *N. Du Ham.*, 7. p. 154., *Smith* in *Rees's Cycl.*, No. 18. Leaves ovate-oblong, coriaceous, entire, shining; downy beneath; somewhat emarginate at the base. Fruit racemose. (*Willd.*) Found by Louis Nee in the kingdom of Mexico, between Chilpancingo and Tixtala, and about the river Azul. This is an elegant tree, 20 ft. or more in height. Trunk thick, with a dark-coloured bark, full of fissures. Branches horizontal; younger ones furrowed, and dotted with white. Leaves 6 in. or 8 in. long, and 3 in. broad; ovate, rigid; sometimes emarginate at the base; green and shining above; downy beneath, with the larger veins prominent, and the smaller reticulated. Footstalks thick, a line in length. Stipules crisped, downy, deciduous. Female clusters solitary, axillary, 2 in. long; the lower ones alternate, upper opposite. Acorns ovate, half-covered by a hemispherical cup, which is the size of the seed of Cicer arietinum, and has its scales scarcely at all imbricated. (*Nee*, as quoted in *Rees's Cycl.*) This is closely allied to *Q.* lùtea, which, indeed, Humboldt considers as the same species; and to *Q.* crassifòlia *Humb. et Bonp.*, p. 1946. It has also a great affinity with *Q.* stipulàris (p. 1945.); but differs in the disposition of its fruit.

Q. *lùtea* Willd., No. 17., Nee in An. Cien. Nat., 3. p. 269., Fisch. Misc. Hisp., 1. p. 105., N. Du Ham., 7. p. 155., Smith in Rees's Cycl., No. 19. The yellow-*leaved Mexican* oak. Leaves obovate, entire, shining; somewhat heart-shaped at the base; downy and yellow beneath. Fruit racemose. (*Willd.*) Native of Mexico. This agrees with *Q.* magnol*iæfòlia* in its growth and fructification; insomuch that it may be thought a variety: yet the leaves are very different. They are of a larger size, broader towards the end, and contracted towards the footstalk; as well as more deeply emarginate at the base; and their under side is covered with ochry yellow pubescence. (*Rees's Cycl.*) Humboldt considers this the same species as *Q.* magnol*iæfòlia*, and very closely allied to his *Q.* crassifòlia (p. 1940.).

Q. *salicifòlia* Willd., No. 8., Nee in An. Cien. Nat., 3. p. 265., Fisch. Misc. Hisp., 1. p. 101., N. Du Ham., 7. p. 152., Rees's Cycl., No. 8. The Willow-leaved *Mexican* Oak. Leaves oblong-lanceolate, entire, smooth; the forks of the veins villous and brown beneath. Nut oblong. (*Willd.*) Found by Louis Nee in the kingdom of Mexico, near Acapulco. A tree, 28 ft. high, with alternate branches; the young ones somewhat furrowed, and clothed with brownish red hairs. Leaves from 5 in. to 7 in. long, 1 in. wide, scattered on short stalks, rather coriaceous, smooth, veiny, entire, wavy, pointed; reticulated and green above; yellowish beneath, with tufts of hairs, as big as a pin's head, in the forks of the veins. Acorns nearly sessile, in axillary pairs, the size of a hazel nut; downy, half-covered by the hemispherical, greyish, villous cup; beset with very thin scales. (*Nee*, as quoted in *Rees's Cycl.*)

Genus II.



*FA`GUS L.* The Beech. *Lin. Syst.* Monœ`cia Polyándria.

Identification. Lin. Gen., No. 1072.; Reich., 1170.; Schreb., 1448.; Gærtn., t. 37.; Juss., 409.; Tourn., 351; Willd. Sp. Pl., 1694.; N. Du Ham., 2. p. 79.; Ait. Hort. Kew., 5. p. 297.

Synonymes. According to Bauhin, the Fagus of the Romans, and the Oxua of the Greeks; *Castànea Tourn.*, 352., *Mill. Dict.*, f. 84.; Hètre, *Fr.*; Buche, *Ger.*; Beuke, *Dutch*; Bog, *Dan.*; Bok, *Swed.*; Buk, *Russ.* and *Pol.*; Faggio, *Ital.*; Haya, *Span.*; Faya, *Port.*

Derivation. From *phagō*, to eat; because the nuts were used as food in the early ages.

Description, &c. Large and handsome deciduous trees; natives of Europe, and of North and South America, and Australia. The wood is used for various purposes; but more especially in cabinet-making, joinery, and turnery. The fruit affords food for swine, and supports squirrels and various wild animals: it also yields a valuable oil. Plants are almost always raised from seed, except in the case of varieties. Linnæus united the genus *C*astànea with *F*àgus, which was not done by any botanist before his time, and which has not been adopted by many of the moderns. The distinctive characteristics of the two genera are, that *C*astànea has the male flowers on very long catkins, with the seeds farinaceous; while *F*àgus, on the contrary, has the male flowers on globular catkins, and the seeds oily. M. Mirbel, who has revised the generic character of the beech, so as to include in it the South American and Australian species, has arranged them in two sections, which arrangement we shall here adopt.

A. *Cupule muricate, capsuliform. Ovaries included. Young leaves plicate.* Natives of Europe, and of North and South America.

a. *Species in Cultivation in British Gardens.*

♀ 1. *F.* SYLVA'TICA *L.* The Wood, *or common*, Beech.

Identification. Lin. Sp. Pl., 1416.; Hort. Cliff., 447.; Fl. Suec., 785. 871.; Roy. Lugdb., 79.; Mat. Med., 203.; Du Roi Harbk., 1. p. 203.; Pollich. Pall., No. 910.; Willd. Arb., 113.; Willd. Sp. Pl., 4. p. 459.; Hoffm. Germ., 339.; Roth. Germ., 1. p. 409., 2. p. 489.; Pall. Ross., 2. p. 5.; Vill. Dauph., 3. p. 796.; N. Du Ham., 2. p. 79.; Br. Fl., 1. p. 408.; Eng. Bot., t. 1846.; Eng. Fl., 4. p. 152.; Hook. Br. Fl., ed. 3., p. 411.; Mackay Fl. Hibern., p. 254.; Lindl. Synop., p. 239.
Synonymes. Castànea Fàgus *Scop. Carn.*, No. 1188.; Fàgus *Bauh. Pin.*, 419., *Cam. Epit.*, 112., *Matth.*, 205., *Dod.*, 832., *Ger.*, 1255., *Ger. Emac.*, 1444., *Park. Theat.*, 1403., *Bauh. Hist.*, 1. p. 118. *Raii Hist.*, 1381., *Synop.*, 439.; *F.* sylvéstris *Michx. N. Amer.*, 3. t. 107., Oxya, *Greek*; Fagus, *Lat.*; Hêtre commun, *Fr.*; gemeine Buche, *Ger.*; Rood-beuke, *Dutch.*
Engravings. Eng. Bot., t. 1846.; N. Du Ham., t. 24.; and the plate of this tree in our last Volume.

Spec. Char., &c. Leaves ovate, glabrous, obsoletely dentate; ciliate on their margins. (*Willd.*) A tree, varying from 60 ft. to 100 ft. in height; wild in various parts of Europe; and one variety in North America.

Varieties.

♀ F. *s.* 2 *purpùrea* Ait. Hort. Kew., v. p. 297., Lodd. Cat., ed. 1836; *F. s.* 2 àtro-rùbens *Du Roi*; Hêtre noir *Fr.*; the purple Beech; has the buds and young shoots of a rose colour. The leaves, when half-developed, are of a cherry red; and, when fully matured, at midsummer, of so dark a purple, as to appear almost black. It is to be observed of this variety, that the bark, not only of the young shoots, but even of the old wood, and of the trunk of the tree, partakes strongly of the same dark colour as the leaves. In early spring, when the leaves of the purple beech are agitated by the wind, during bright sunshine, their clear red gives the tree the appearance of being on fire; an effect, Bosc observes, so truly magical, that it is scarcely credible by those who have not seen it. The red or purple colour of this variety varies in degree of intensity in different individuals; partly from these having been raised from seeds, and partly from the influence of soil and situation. The purple beech is a native of Germany, where it was discovered by accident in a wood, according to some, between the middle and the latter end of the last century; and the original tree is said to be still standing. From this tree all the purple beeches in Europe have been produced; partly from seeds (see *Gard. Mag.*, vol. x. p. 180.), but chiefly by grafting. The seeds, in general, come up tolerably true; though in some the shade of purple is very faint, and in others the leaves are quite green. The different shades of purple have given rise to several subvarieties, which are kept distinct by some nurserymen; but none that we have seen are worth notice, except what is called the copper-coloured beech. In general, the purple beech is propagated by budding or grafting on the common beech; but sometimes it is increased by layers, which require two years to become properly rooted, and, it is said, never make such vigorous trees as grafted ones; doubtless, from the greater vigour of the stock in the latter case. Michaux the younger informed Bosc that there was a purple beech in Belgium which ripened seeds, and that from these seeds several subvarieties had been produced, and, among others, the copper beech, before mentioned. The largest specimens of the purple beech are, probably, in Germany; though we have not been able to hear of any on the Continent higher than between 30 ft. and 40 ft., with the exception of two; the one at Harbke, in Brunswick, which, in 1835, was 70 ft. high, with a trunk 2 ft. 6 in. in diameter, and had been planted upwards of 60 years. It produces on an average, 20 lbs. of mast yearly, which sells at 2 dollars per lb. The other tree is near Antwerp, in the garden of M. Smetz, at Deurne, and is thus described in Neill's *Horticultural Tour*, as seen by the Deputation of the Caledonian

Horticultural Society, in the autumn of 1817. This tree had been grafted on a common beech stock, about 3 ft. from the ground. The place of grafting is marked by the stock being larger than the graft on every side; so that the stem of the purple beech seems as if it had been merely set down flat on the stock. "At 1 ft. from the ground, the trunk of the stock, or common beech, measures 10 ft. 10 in. in circumference; and, immediately at the place of grafting, the trunk of the purple beech measures only 9 ft. 6 in. in circumference." From the ground to the first branch is about 12 ft. The total height of the tree is between 50 ft. and 60 ft., and the diameter of the head is 45 ft. It was planted in 1752, and was, consequently, when seen by Dr. Neill, about 65 years old. It is altogether, says the doctor, "a very handsomely formed well-balanced tree. To a spectator standing directly under it, the leaves appear nearly of the usual green colour; and they are but slightly tinged with purple as far as they are excluded from the sun: as they approach outwards, they get a stronger purplish hue; and on the very exterior they are of a deep purple; insomuch that the tree, when seen from a distance, appears clothed in black;" and hence the name which it bears in Belgium, of *swartze beeckenboom*, the black beech tree. This tree every year ripens seeds, from which numerous young plants have been raised, the greater part of which have purple leaves; and, in a young hedge in M. Smetz's garden formed of seedling plants from this tree, the deputation "observed every variety of hue in the foliage, from green to purple; yet no individual was completely green. and none completely purple." (p. 107.) This tree, in all probability, is the same as that alluded to by Bosc. On writing to Dr. Somme, Director of the Botanic Garden at Antwerp, in May, 1837, he informs us that the trunk, at 7¾ in. above the graft, is 15 ft. 10 in. in circumference; but that at 6 ft. 7 in. above the graft the circumference is 3 ft. 10 in. less. The diameter of the head is 72 ft., and the total height of the tree is 72 ft. The handsomest purple beech in England is at Enville; and, when we saw it in 1831, it was between 60 ft. and 70 ft. high, clothed with branches to the ground, where it extended over a space above 60 ft. in diameter. It stands on a small lawn in the pleasure-grounds, and is, consequently, protected from cattle. The loftiest purple beech in England is at Syon, where, in 1834, it was 71 ft. high; the diameter of the trunk 2 ft. 10 in., and of the head 61 ft. It flowers, and occasionally ripens seed, from which, however, we believe, no plants have yet been raised.

♈ F. *s.* 3 *cùprea* Lodd. Cat., ed. 1836, *the copper-coloured Beech*, above alluded to, as a subvariety of *F.* s. purpùrea, has the young shoots and leaves of a paler colour than those of the purple beech. It makes a splendid appearance in the sunshine, and when the leaves are gently ruffled with the wind; but, in a state of repose, and on a dark cloudy day, it can hardly be distinguished from the common green-leaved beech.

♈ F. *s.* 4 *fòliis variegàtis* Lodd. Cat., ed. 1836, has the leaves variegated with white and yellow, interspersed with some streaks of red and purple. This variety is handsome in spring, when the leaves first make their appearance; but, in the course of the summer, their variegation is in a great measure lost, and the leaves assume a dirty unhealthy aspect. There are also varieties with the leaves striped or blotched with white only, and others with only golden-striped leaves.

♈ F. *s.* 5 *heterophýlla*; *F.* s. laciniàta *Lodd. Cat.*, ed. 1836; *F.* s. asplenifòlia *Lodd. Cat.*, ed. 1836; *F.* s. incìsa *Hort.*; *F.* s. salicifòlia *Hort.*; Hêtre à Feuilles de Saule, *Fr.*; *the various*, or cut, *leaved Beech;* has the leaves variously cut, as in *fig.* 1875.; sometimes in narrow shreds, so as to resemble a fern, as in *fig.* 1876.; and, at other times, in shreds of



1875



1876

greater breadth, like the leaves of a willow. This variety, which may be designated as more curious than beautiful, is very apt to return to the normal form. There were, in 1834, handsome small trees of this variety in the Horticultural Society's Garden; and there are plants at Messrs. Loddiges's, and in other London nurseries. In Berkshire, at White Knights, this variety, 25 years planted, is 22 ft. high; in Durham, at Southend, it is between 40 ft. and 50 ft. high. In the Perth Nursery, 20 years planted, it is 22 ft. high. At Oriel Temple, in Ireland, 20 years planted, it is 22 ft. high.

♈ F. *s.* 6 *cristàta* Lodd. Cat., ed. 1836; *F.* s. críspa *Hort.*; Hêtre Crête de Coq, *Fr.*; *the crested*, or curled-leaved, *Beech*; our *fig.* 1877.; and the plate of this tree in our last Volume.—This variety is a monstrosity, with the leaves small, and almost sessile, and crowded into small dense tufts, which occur at intervals along the branches. The tree never attains a large size, as may be expected from its deficiency in foliage. The wood of this variety, as shown in Sepps's *Icones Lignorum*, t. 3. f. 2., is quite different from that of the common beech; being dark, and curiously curled and veined. There is a specimen of this variety in the Glasnevin Botanic Garden, 31 years planted, which is 20 ft. high.



1877

♈ F. *s.* 7 *péndula* Lodd. Cat., ed. 1836; Hêtre Parasol, *Fr.*; *the weeping Beech.* (See the plate of this tree, which is a portrait, taken in 1835, from one still standing in the Kensington Nursery, in our last Volume.)—When this variety is grafted standard high, it forms a very singular and highly beautiful object, well deserving a place in collections of weeping

trees. There is a specimen at Oriel Temple, in Ireland, 33 ft. high, diameter of the head 24 ft. The Rev. M. J. Berkeley informs us, in a letter dated June 2. 1837, that in "one of the plantations bordering Milton Park, the seat of Earl Fitzwilliam, in Northamptonshire, there is a beautiful accidental weeping variety of the beech. The trees have been cleared round it, and it is a very flourishing young tree. The branches are beautifully pendent, and even the last six feet of the top bend down. Mr. Henderson, the very intelligent gardener, has propagated it by grafts. The height is 50 ft., and the girt 3 ft. at 1 ft. from the base, by measurement just made for the purpose." So splendid a variety will, we trust, soon find its way into the public nurseries.

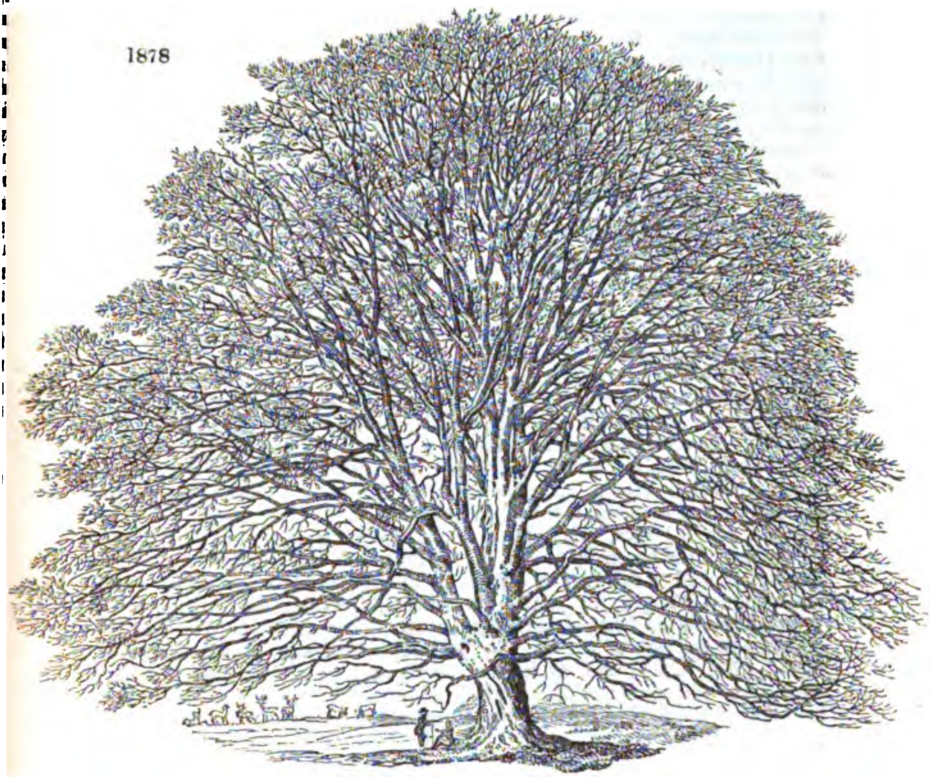
Other British Varieties or Variations. In some beech woods, trees are found with a rough and somewhat chapped bark; and these are called the hay beech by the woodmen in Buckinghamshire and Gloucestershire; but we have not heard of the kind having been propagated either by seeds or grafting. There is also what joiners call the red, or the yellow, beech, and the white beech; the former having dark-coloured wood, and the latter having the wood white. These two varieties are commonly considered as being produced by the locality, the darker wood growing in the better soil. According to Mathews, "the yellow beech grows faster and straighter, and is cleaner and freer of black knots, and also more pleasantly worked than the white; but it corrupts much sooner in the bark when cut down. This variety of beech, when properly trained," he continues, "is, probably, the most profitable hard wood that we can raise: when planked, it bends pleasantly under the shipwright to the curvature of the vessel's side. The tree is also much superior in size and grace of outline to the white." (*On Nav. Tim.*, p. 49.) This variety ought to be sought out in beech woods, or in plantations, and the mast collected from it for propagation: it ought also to be propagated by grafting or budding, as an experiment to try whether the colour of wood can be continued without reference to the soil on which the stock grows. Mitchell says there are two sorts of beech, the black and the white wooded; but he knows no sort of botanical distinction between them. He never met, he adds, "with five trees of the black beech on any estate," and, therefore, concludes that the colour of the wood is merely a variation resulting from soil.

♀ F. *s.* 8 *americàna*; *F.* sylvéstris *Michx. N. Amer. Syl.*, 3., t. 107.; white Beech, *Amer.*; is generally considered by botanists as identical with the common European beech. This it very probably is; but, from the figure in Michaux, and the description given by him of the wood, it appears to us somewhat different from the species. In North America, it forms one of the tallest and most majestic trees of the forest, abounding in the middle, western, and southern states; but most abundant in the middle and western states, and composing large masses in Genessee, Kentucky, and Tennessee, in deep moist soil, and in a cool atmosphere. The trunks of the trees are frequently 8 ft., 9 ft., and 11 ft. in circumference, and more than 100 ft. high. The tree is less branchy than the *F.* ferrugínea, or red beech of America; and the perfect wood bears but a small proportion to the sap, frequently occupying only 3 in. in a trunk 1 ft. 6 in. in diameter. The wood of the white beech is little valued in America, even for fuel; and the bark is used for tanning, but is little esteemed; and, therefore, in point of utility, the tree cannot be recommended for culture in Europe: but, if it should prove distinct from the common beech, it well deserves introduction as an ornamental variety.

Description. The European beech is a handsome umbrageous tree, combining magnificence with beauty; and being, as Mathews observes, at once the Hercules and Adonis of our sylva. It has a smooth thin bark, which is

white when fully exposed to the air. The leaves are shining, thin, changing to a brown or russet colour in autumn; and, on soil somewhat moist, or in wet autumns, remaining on the tree throughout the winter. On young trees, and on trees planted in hedgerows and pruned, the leaves are more certain of remaining on during the winter, than on large, old, and detached trees. The head of the beech is, in general, so dense, that plants do not readily grow under it; which is also partly owing to the leaves requiring a long time to decay after they fall. The branches of the beech, whether in old or young trees, generally take an upright direction, and form acute angles with the stem; though, in old trees, the lower branches are often horizontal, and sometimes bent down in the middle, and curving upwards at the extremity. The branches are very numerous, and the smaller shoots much divided; but the direction both of the branches and spray is always more or less straight, as compared with that of the branches and spray of the oak, the ash, and some other trees. The roots do not descend deeply into the soil, but extend to a considerable distance close under the surface. The rootlets and fibres are not nearly so numerous as in the ash and the elm. The barren flowers are in round, stalked, drooping heads, or catkins, of a light brown colour, and 3 or 4 in each head. The fertile ones are placed above them on the branch, and are solitary, and on stouter stalks than the male catkins. The calyx of the fruit is 4-cleft, clothed with simple pliant prickles. The stigmas are 3 in each flower; spreading, acute, and downy. Nuts 2, with 3 equal very sharp angles, and crowned with the inner calyx. The flowers appear in May, and the fruit ripens in October. The fruit, when ripe, opens at the upper extremity, in four divisions; and, after a short time, the nuts frequently drop out, leaving the calyx, or cup, which contained them, attached to the tree. The nut contains a white oleaginous substance, agreeable to eat. The seedlings of this tree, Sir J. E. Smith observes, when newly sprung up, with their pale cotyledons, look not unlike some kinds of fungus. The plants, under nursery culture, do not grow so rapidly as those of the ash and the elm; but, under favourable circumstances, they will attain the height of 10 ft. in 5 years, and 20 ft. or 25 ft. in 10 years. The height of the tree, when full grown, and in a situation where it is allowed to spread, may be considered as from 60 ft. to 80 ft. In Germany, according to Willdenow, it is from 50 ft. to 60 ft.; but, when drawn up by other lofty-growing trees, it sometimes attains the height of from 100 ft. to 120 ft., as may be seen in the figures of the King and Queen Beeches, at Ashridge, given in our *Statistics*, in a future page. A spreading beech, at Studley Park, of which *fig.* 1878. is a portrait to a scale of 30 ft. to 1 in. (drawn for us by H. W. Jukes, Esq., by the permission Mrs. Lawrence), is 114 ft. high, and exhibits, in respect to general form and ramification, the common character of the tree when growing detached from all others. The life of the beech tree, in its native habitats in Germany, according to Willdenow, extends to 200 years, and upwards. The oldest beech tree in England is probably that in Windsor Forest, which is supposed to have been in existence before the Norman Conquest, and will be hereafter figured and described. In general, the tree attains its full growth, in England, in 60 or 80 years, when it is fit to be cut down for timber purposes; and, on good soils, it is more than doubtful whether it will live much more than 100 or 150 years. When the tree is cut, the wounds heal quickly over, so as to leave but very slight scars; and, when branches are cut off close to the trunk, it is not liable to throw out fresh shoots. According to German authors, the beech, when treated as coppice-wood, will continue to send up shoots till it has attained the age of 30 or 40 years, but seldom to a greater age; and, hence, it is not well adapted either for coppice or underwood. The tree, when under a course of nursery culture, and before it is removed to its final destination, suffers severely from the removal of any of its branches; but, when once established as a hedge, it bears pruning as well as any other tree. The branches of the beech, particularly in woods, being much crowded, and having a smooth bark, are particularly liable to cross and grow

1878



into each other, and, as it were, inosculate; and hence, according to some, it was this tree that gave the first idea of grafting. A curious example will be found under the head of *Accidents and Diseases*.

Geography. The common beech is a native of the temperate parts of Europe, from the south of Norway to the Mediterranean Sea, and from England to Constantinople. It is also found in Palestine, Asia Minor, Armenia, and Mazanderan. In Norway, it is found as far north as 59°, in favourable situations; and, in Sweden, to 58°. According to Pallas, it is plentiful in the southern provinces of Russia, and in Caucasus; but it is not common in the plains; and it is nowhere to be found in the northern provinces. It abounds in the forests of Poland, and in Lithuania. The line of beeches on the Alps rises to the elevation of 5132 ft., between lat. 45½° and 46½°; the snow line being 3848 ft. higher. (*Von Buch*, as quoted by *H. C. Watson*.) In Switzerland, the beech occupies the south sides of the mountains, where it rises as high as the *V*accínium *V*ìtis idæ'a, and where the silver fir clothes the north side. (*Nat. Hist. Jorât.*, vol. i. p. 9.) In France, it is found on the sloping sides of mountains, and on calcareous hills; but almost always on the south side. According to some, the European beech is also a native of America, where it is known under the name of the white beech; but, as we are inclined to doubt whether this may not be something different from the European beech, we have treated it as a variety, and given its geography, when speaking of it, as such. (See p. 1953.) In Great Britain, the beech is found in forests, supposed to be indigenous, in various parts of the central dis-

tricts of England, especially on chalky hills. Some, as we have seen (p. 21.), are disposed to consider the tree as not aboriginal; but with this supposition we cannot agree. It abounds on the great ridge of chalk hills which passes from Dorsetshire through Wiltshire, Hampshire, Surrey, Sussex, and Kent; branching out into Berkshire, Buckinghamshire, and Hertfordshire; and it is also found on the Stroudwater and Cotswold Hills in Gloucestershire, and on the bleak banks of the Wye in Herefordshire and Monmouthshire. It is particularly abundant in Buckinghamshire, where it forms extensive forests, of great magnificence and beauty. It is seldom found mixed with other trees; its own dense head suffocating most other species, even when they are coeval with it in point of age. Nothing, says South, will grow under the beech but the holly and the truffle. It is rarely found in soil that is not more or less calcareous; and it most commonly abounds on chalk. In some parts of Hertfordshire, where the soil is a calcareous clay full of flints, the beech attains a large size. The tree is not indigenous to Scotland or Ireland.

History. The beech was known to both the Greeks and Romans; though some doubts have arisen as to the names by which it was designated by these nations. By Theophrastus it was called Oxua, and by Dioscorides Phēgos. Theophrastus also describes a tree under the name of Phēgos; but he places it among the oaks; and it is now generally supposed to be the *Quércus Æ'sculus L.* Doubts have also arisen as to whether our beech was the *Fàgus* of the Romans, from the assertion of Cæsar, in his *Commentaries*, that he found no *Fàgi* in Britain (see p. 21.); but that the *Fàgus* of Pliny and Virgil was the same as that of Linnæus, is thus proved by Fée, in his *Flore de Virgil.* "Pliny (lib. xvi. cap. 6.) says, 'Fagi glans, nuclei similis, triangulâ cute includitur.' (The mast of the beech is like a nut, included in a triangular case.) The epithets applied to this tree by Virgil are all applicable to our beech. It is spreading: — 'Tityre, tu *patulæ* recubans sub tegmine fagi.' (*Ecl.* i. 1.) It has dense tufted foliage; and, consequently, its branches afford a shade impervious to the rays of the sun: — 'Tantum inter *densas, umbrosa cacumina,* fagos' (*Ecl.* ii. 3.); and, as it lives nearly as long as the oak, it is well entitled to the epithet of old: Aut hic ad *veteres* fagos. (*Ecl.* iii. 12.) It is also one of the loftiest trees of the European forests: — 'Cæditur et tilia ante jugo lævis, *altaque* fagus.' (*Geor.* i. 173.) It thus appears that the *Fàgus* of Virgil agrees in every respect with the beech tree of the moderns." (*Fl. de Virg.*, p. 54.) The ancients seem to have set considerable value on the beech mast as an article of food. Pliny speaks of the mast (glandem) of the beech as being the sweetest of all (dulcissima omnium); and states that, at the siege of Chios, the besieged lived for some time entirely on beech mast. Vessels made of beech wood were used in the Roman sacrifices; and the nut was in repute as a medicine. Pliny and Virgil both tell us that the beech was grafted on the chestnut; a circumstance which has called forth much discussion among commentators. Servius thinks it absurd that a barren beech, as he calls it, should be engrafted on a fruitful chestnut; and fancies that there is an error in the text. Grimoaldus thinks that the poet means a wild sort of chestnut, which might be used as a stock on which to graft the beech; and Dr. Trapp highly approves of this reading. These, and other commentators, Martyn observes, proceed on the supposition that chestnuts were esteemed, in Virgil's time, as much superior to beech mast as they are now; the contrary to which, he says, might easily be proved. Pliny mentions chestnuts as a very inferior kind of fruit, and seems to express surprise that nature should take such care of the nuts, which he calls "vilissima," as to defend them with a prickly husk; while the mast of the beech was reckoned a very sweet nut, and was in use both as food and medicine. Pliny frequently mentions the beech in his *Natural History*. In one place, he says that "there was a little hill called Corne, in the territory of Tusculum, not far from the city of Rome, that was clad and beautified with a grove and tufts of beech trees, which were as even and round in the head as if they had been curiously trimmed with garden shears." He adds: — "This grove was, in old

times, consecrated to Diana, by the common consent of all the inhabitants of Latium, who paid their devotions to that goddess there. One of these trees was of such surpassing beauty, that Passienus Crispus, a celebrated orator, who was twice consul, and who afterwards married the Empress Agrippina, was so fond of it, that he not only delighted to repose beneath its shade, but frequently poured wine on the roots, and used often to embrace it." Beechen cups were used by the Latin shepherds; and this custom is frequently alluded to by the poets. The oldest British writers on rural affairs mention the beech as one of the four indigenous timber trees of England. Its timber, however, was considered inferior to that of the three other timber trees, viz. the oak, the ash, and the elm. The mast of the beech has been, from the earliest times, valued as food for swine; and, in some parts of Buckinghamshire, where the tree abounds, swine are still driven into the beech woods in autumn. About 1721, Aaron Hill, the poet, proposed a scheme for paying off the national debt with the profits of the oil to be made from beech nuts; but his scheme fell to the ground. Other plans for making beech oil have been suggested, but always without success. Indeed, it is probable that the mast requires to be ripened in a warmer climate than that of Britain to make it produce oil in sufficient quantities for profit; as Linnæus expressly states that, in Sweden, scarcely any oil at all can be expressed from it. The usefulness of the beech, at the time when forests were chiefly valued for the number of swine that they could support, together with the facility with which the tree is raised from seed, must have rendered it one of the first trees propagated and planted by art. Accordingly, Gerard, in 1597, speaks of the excellent effect which the nuts had in fattening swine, deer, and pigeons; and Parkinson, writing in 1640, says that the beech is planted in parks, forests, and chases, to feed deer; but, in other places, to fatten swine, "whose fat," he adds, "will be softer than theirs that are fattened with acorns." The beauty of this tree, the density of its shade, and the classical associations connected with it, independently altogether of the uses of its fruit, occasioned it to be early planted as an ornamental tree, both in Britain and on the Continent. We find both Evelyn and Cook recommending it for shady walks, avenues, and hedges; for which latter purpose, where it is desired to enclose and warm gardens, Boutcher observes, this tree has hardly an equal. Between 1790 and and 1800, some trunks of beech trees were found at a considerable depth below the surface, in St. Leonard's Forest, Hampshire. They had evidently been squared with proper tools; and are supposed to have lain there ever since the time of the Romans. The beech, Dr. Walker observes, was not much planted in Scotland till between 1540 and 1560; and many of the trees then planted at Hopetoun House, Arniston, Inverary, and Newbattle, still exist, and are the oldest in the country. The beech was probably planted in Ireland about the same time that it was introduced into Scotland; and it attains an enormous size on the calcareous loams and the sloping sides of hills of that country. The first planted beeches in Ireland are believed to be those at Shelton Park; but the largest is in Charleville Forest. The most extensive planter of the beech tree in Scotland has been the Earl of Fife, who, in the latter half of the last century, planted many thousand beech trees in the county of Moray, for which he received the gold medal of the Society of Arts. In England, after the Revolution of 1688, when William III. introduced the Dutch style of gardening, the beech was much planted for hedges, both for shelter in gardens and nurseries, and for forming the clipped sides of alleys in geometrical plantations. Extensive plantations of beech for timber were made, between 1784 and 1788, at Belmont in Staffordshire, and by the Bishop of Llandaff near Ambleside. The tree still continues to be planted; but, now, more for ornamental purposes than for the value of either its timber or its fruit. Between 1680 and 1690, Lord Scarborough, according to Mitchell, had an avenue cut through Stanstead Forest, in Sussex; and within the Park, on each side of the entrance of the avenue, there were about 10 acres planted with beech, which, in 1827, were from

80 ft. to 90 ft. high, with clear trunks of from 30 ft. to 40 ft.; and from 8 ft. to 14 ft. in circumference at 4 ft. from the ground. We saw some of these magnificent trees in 1831, and can bear testimony to the amplitude of their dimensions, and to their being apparently in good health; though, we believe, some of those alluded to by Mitchell have been cut down since his time.

Poetical and legendary Allusions. The poetical allusions to the beech, among the Latin poets, are very numerous: Virgil frequently mentions it, several instances of which have been quoted in p. 1956.; but, among the most celebrated, are the well-known lines, —

> "Tityre, tu, patulæ recubans sub tegmine fagi,
> Sylvestrem tenui musam meditaris avena."
>
> "Beneath the shade which beechen boughs diffuse,
> You, Tityrus, entertain your sylvan Muse." DRYDEN'S *Virgil.*

And the following: —

> "Or shall I rather the sad verse repeat
> Which on the beech's bark I lately writ?" DRYDEN'S *Virgil.*

In the third *Eclogue*, Virgil makes his shepherds boast of their beechen bowls. Tibullus says, —

> —— "No wars did men molest,
> When only beechen bowls were in request."

In more modern times, we may quote the well-known lines from Tasso's *Gerusalemme Liberata*: —

> "Nella scorza de' faggi e degli allori
> Segnò l' amato nome in mille guise."
>
> "On the smooth beechen rind the pensive dame
> Carves in a thousand forms her Tancred's name." HOOLE'S *Tasso.*

Garcilasso, the Spanish poet, has several allusions to this tree: —

> "Under the branches of the beech we flung
> Our limbs at ease, and our bent bows unstrung.
> Thus idly lying, we inspired with zest
> The sweet fresh spirit breathing from the west." WIFFEN'S *Garcilasso.*
>
> "The sun, from rosy billows risen, had ray'd
> With gold the mountain tops, when at the foot
> Of a tall beech romantic, whose green shade
> Fell on a brook, that, sweet-voiced as a lute,
> Through lively pastures wound its sparkling way,
> Sad on the daisied turf Salicio lay." *Ibid.*
>
> "Not a beech but bears some cipher,
> Tender word, or amorous text:
> If one vale sounds Angelina,
> Angelina sounds the next." DON LUIS DE GONGORA.

Among the English poets, we may find numerous allusions to, and descriptions of, the beech; and of these we shall give a few. Milton says, —

> "In beechen goblets let their bev'rage shine,
> Cool from the crystal spring their sober wine."

Beaumont and Fletcher, in the *Faithful Shepherdess*, allude to Pan, —

> "That sleeping lies in a deep glade,
> Under a broad beech's shade."

Leigh Hunt, in a translation from Theocritus, says, —

> "I ran to meet you, as the traveller
> Gets from the sun under a shady beech."

The most generally quoted lines in English, on the beech tree, are, however, those of Gray, Campbell, and Wordsworth, all of which we shall give below. Gray says, —

> "There at the foot of yonder nodding beech,
> That wreathes its old fantastic roots so high,
> His listless length at noontide he would stretch,
> And pore upon the brook that bubbled by." GRAY.

Campbell's lines are entitled "The Beech Tree's Petition:"—

"Oh, leave this barren spot to me!
Spare, woodman, spare the beechen tree!
Though bud and flow'ret never grow
My dark unwarming shade below;
Nor summer bud perfume the dew,
Of rosy blush, or yellow hue;
Nor fruits of autumn, blossom born,
My green and glossy leaves adorn;
Nor murmuring tribes from me derive
Th' ambrosial amber of the hive;
Yet leave this barren spot to me:
Spare, woodman, spare the beechen tree!

"Thrice twenty summers I have seen
The sky grow bright, the forest green;
And many a wintry wind have stood
In bloomless, fruitless solitude,
Since childhood in my pleasant bower
First spent its sweet and sportive hour;
Since youthful lovers in my shade
Their vows of truth and rapture made,
And on my trunk's surviving frame
Carved many a long forgotten name.
Oh! by the sighs of gentle sound,
First breathed upon this sacred ground;
By all that love has whisper'd there,
Or beauty heard with ravish'd ear;
As Love's own altar, honour me:
Spare, woodman, spare the beechen tree!" CAMPBELL.

The lines of Wordsworth are the following: —

——" A single beech tree grew
Within the grove of firs; and in the fork
Of that one beech appear'd a thrush's nest;
A last year's nest, conspicuously built,
At such small elevation from the ground,
As gave sure sign that they who in that house
Of nature and of love had made their home,
Amid the fir trees all the summer long,
Dwelt in a tranquil spot."

The finest beech trees in Britain are said to grow in Hampshire; and there is a curious legend respecting those in the Forest of St. Leonard, in that county. This forest, which was the abode of St. Leonard, abounds in noble beech trees; and the saint was particularly fond of reposing under their shade; but, when he did so, he was annoyed during the day by vipers, and at night by the singing of the nightingale. Accordingly, he prayed that they might be removed; and such was the efficacy of his prayers, that, since his time, in that forest,

"The viper has ne'er been known to sting,
Or the nightingale e'er heard to sing."

Properties and Uses. The beech, in a state of nature, affords food to wild pigeons and other birds, and to squirrels, deer, wild swine, and other animals, in autumn; but, in spring and summer, its leaves are eaten but by very few insects. It affords shade to cattle, who do not readily eat either its leaves or branches; but, by the density of its foliage, it destroys the grass, and almost every other plant that grows beneath its shade, except the holly, and sometimes the box, and the truffle and some other fungi. Subjected to man, the beech is chiefly valued for its timber, which is applied to a great variety of purposes, though to none of much importance either for house or ship building. The wood, which, when green, is harder than that of any of our British timber trees, weighs, when in this state, 65 lb. 13 oz. per cubic foot; half-dry, it weighs 56 lb. 6 oz.; and quite dry, 50 lb. 3 oz. The wood, when the tree has grown in good soil, and on plains, has a somewhat reddish tinge; but in poor soils, and on mountains, it is whitish. Its transverse fibres are very obvious; sometimes forming distinct and rather dark lines, and at other times showing shining dense laminæ, of a darker colour than the rest of the wood. In quality, it is hard, brittle, and very apt to be devoured by insects; and, though in beech forests, where the trees have been drawn up by one another, beams may frequently be had 100 ft. in length, they are seldom, if ever, employed in carpentry. The durability of the wood is said to be increased by steeping it in water; and, according to some, by dis-

barking the tree while standing. Mathews, who always writes from experience, says that the timber of the beech "soon corrupts, if it be not speedily dried, or kept in water after being cut down;" and that it is equally liable to corruption in the tree, when deprived of life by wounds or other injury. The beech has, he says, "a matured and a sap wood, although they are not very distinguishable, being nearly of one colour. The former has considerable durability when kept dry; but the latter is speedily consumed by worms." (*On Naval Timber*, &c., p. 49.) Mathews recommends the beech with yellow-coloured wood, found on good soil, as superior in durability to that with white wood, which is only to be found on light soils. The grain of the wood is not sufficiently homogeneous to receive a very high polish. The uses of the wood of the beech, notwithstanding all its faults, are more extensive than those of almost any other tree. The keels of vessels are often made of it; and Mathews, as we have seen (p. 1953.), says that a tree, when properly trained, affords, probably, the most profitable hard wood that we can raise for planking the sides and bottoms of vessels. Beech wood is employed in making piles, ringing mill-wheels (in which situation, according to South, it has stood uninjured for more than 40 years), for weirs, sluices, flood-gates, and, in general, for all works which are to be constantly under water. Before cast-iron wheels and pinions became general, beech was much used for making the cogs of wooden wheels. In England, at the present time, the beech is principally employed in making bedsteads and chairs; and it is also in great demand for panels for carriages, and for various purposes in joinery, cabinet-making, and turnery. Screws, wooden shovels, peels for bakers' ovens, and rims for sieves, are also made of it. In Scotland, the branches and spray are distilled for producing the pyroligneous acid; and the wood is used there not only for the same purposes as in England, but also for making herring barrels; and the wood, the branches, the chips, and the spray are much used for smoking herrings, in the Highlands, along the sea coast. The bedsteads, and other articles of furniture, made of the beech, are stained in imitation of mahogany; and the chairs are either stained or painted. For various minor uses, such as handles to jugs, teapots, &c., it is stained in imitation of ebony; and, according to Evelyn, it is blacked and polished with a mixture of soot and urine, to imitate the walnut: but the colour thus produced does not last. In France, it is used as a substitute for walnut as gun stocks. In Germany, the carriages of cannon are frequently made of it, particularly at sea ports; it being found to last longer where the atmosphere is humid and saline, than the wood of the elm. It is also used there, and in many other parts of the Continent, for the felloes of wheels, and for bowls, porringers, salt-boxes, screws, spindles, rollers, spinning-wheels, pestles, presses, and bellows. It is in very common use for tables, and for the framework and boards of beds; for wardrobes, chests of drawers, desks, hames for horses' collars, frames for saddles, hoops for sieves and riddles, bushel and other measures, cases for drums, and for a great variety of other purposes. Sawn into thin boards, it forms a great variety of boxes and packing-cases, also scabbards for swords, and cases of various kinds. It is used by the German bookbinders, instead of pasteboard, for forming the sides to thick volumes, which were originally called books, from the German name of this wood, buch. According to Bory St. Vincent, it is the best of all wood for forming the upper board of that kind of press (for pressing and drying plants) which, in France, is called a coquette. (See *Dict. Class. d'Hist. Nat.*, art. Hêtre; and *Annales des Scien. Nat.*, t. iv. p. 504.) It is used for making cricket-bats both in France and Germany, as the willow is in England; and in both countries, also, the socks of the old heavy wooden ploughs are made of it. Baudrillart informs us that, in some parts of France, little boats are hollowed out of the trunks of large beech trees, for using in small rivers, and in fishing-ponds; and he adds that it is preferred to all other woods for the oars of galleys. But the most important manufacture of beech wood on the Continent, and especially in France, is that of the wooden shoes called sabots. These sabots are rather more

brittle than those of the walnut and of alder; but they have the property of not absorbing water, and surpass the sabots of all other wood, except only those made of the walnut, which are, of course, much dearer, from the demand for that wood for other purposes. The consumption of beech sabots in the mountainous districts of France, according to Bosc, is immense. "They are made of wood which has been cut only a few months, and is, consequently, nearly green; but which the manufacturers dry rapidly, with the smoke produced by burning the chips which are formed in making the sabots. This smoke, containing a great deal of moisture, or steam, along with the heat, does not crack the sabots which are exposed to it; while the pyroligneous acid which is evolved (and which is produced in a greater quantity by the wood of the beech than by that of any other tree) penetrates the sabot, and renders it not liable to be attacked by insects. The sabots so treated are always of a brownish colour, the effect of this process. Bosc suggests the idea of impregnating rafters and planks, to be used in house-building, with pyroligneous acid, by smoking them with the spray and chips of the beech, so as to increase their durability; an operation which is found to have that effect on the rafters of all kinds of wood used in those cottages in Scotland and Ireland which are without ceilings. At St. E'tienne, in France, the wood of the beech is used to make the handles to those cheap knives that are sold all over France at 2 sous a piece, and which are called Eustache Dubois, from the name of their inventor; but for this purpose the wood is hardened after it has been formed into the handles, and attached to the blade, by being powerfully compressed into a mould of steel, previously rendered almost red-hot. The chips of beech wood are considered preferable to all others for clarifying wine. To render the wood of the beech more durable, and to prevent it from being attacked by the worm, it is recommended by some authors to fell the tree in the commencement of summer, while it is full of sap; to allow it to remain untouched one year; and afterwards to cut it up into planks or beams, and to immerse these for several months in water. The French allege that it is by these means that the English are enabled to use the beech so extensively in planking ships, and in forming their keels. It is difficult to reconcile this recommendation to allow the tree to remain one year after it has been felled with what we before stated from Mathews (p. 1960.), and which is, doubtless, the result of his own experience; viz. that the timber of the beech soon decays, if it be not immediately dried, or immersed in water on its being cut down. Baudrillart states that, in England, the beech, after being cut in the beginning of summer, and suffered to lie a year, is sawn into planks, &c.; and that these are submitted to the flame of the chips and faggot-wood of the tree, till the surface of the wood is somewhat charred; and that after this it is immersed in water for 4 or 5 months. The cabinet-makers, the same author states, prevent it from being attacked by worms, by varnishing it, or by keeping it for a certain time in boiling water, or in boiling oil. On enquiry in various directions, we have not been able to have the French reports of the English practice confirmed; but we find that there is at present a very great demand for beech, as sleepers or bearers for the rails of the numerous railways that are now existing. The beech used in this way in England is Kyanized; but the practice has not yet found its way into Scotland. In Hampshire, we are informed by Mr. Davis, the beech is a good deal used for barn floors; and, where these are kept free from damp, by a thorough ventilation underneath them, they are said to last many years.

As Fuel, the wood of the beech is superior to that of most other trees. It is consumed to an immense extent for this purpose both in France and Germany; but more especially in Paris, where there are more open fires than in any other Continental city. It is considered to burn rather rapidly; but it throws out a great deal of heat, and makes a clear bright flame. The green wood is generally preferred to that which is dry, because it burns slower, though it does not give out so much heat; and hence, in many places, the tree is frequently cut down in the summer season. According to the experiments

of M. Hartig, there are only the sycamore, the Scotch pine, and the ash, which produce more heat and light in burning than the beech. It is superior to the oak in this respect, in the proportion of 1540 to 1497; and its charcoal is superior to that of the oak, as 1600 is to 1459. Charcoal is made in great quantities from the beech, in Buckinghamshire, for the manufacture of gunpowder. The beech, burnt green, produces heat and light relatively to the beech burnt dry, as 1181 is to 1540. These experiments of M. Hartig are, however, considered by some as not quite correct. The ashes of the beech are said by Bosc to be rich in potash; but this is doubted by Baudrillart. Werneck found experimentally, that, out of 73 species of trees, there were 47, the ashes of the wood of which yielded more potash than the ashes of that of the beech. He found that 100 lb. of beech wood, burnt green, gave 1 lb. 4 oz. 7 grains of this salt; but that 100 lb. of the bark and spray gave 1 lb. 10 oz. The bark, both in America and in Britain, is used for tanning, though it is considered of no great value for that purpose. Monteath ranks it in the fifth place, along with that of the birch; both of which, he says, are considerably weaker than that of the Spanish chestnut, and not nearly equal to that of the oak. Evelyn says, "Of old, they made their vasa vindemiatoria and corbes messoriæ, as we our pots for strawberries, with the rind of this tree. Nay," he adds, "and vessels to preserve wine in; and that curiously wrought cup, which the shepherd, in the *Bucolicks*, wagers withall was engraven by Alcimedon upon the bark of the beech." (*Hunt. Evel.*, i. p. 135.) The leaves, gathered green, and dried, were formerly used in Britain, and still are in various parts of the Continent, for filling beds. Evelyn says that, "being gathered about the fall, and somewhat before they are much frost-bitten, they afford the best and the easiest mattresses in the world, to lay under our quilts, instead of straw; because, besides their tenderness and loose lying together, they continue sweet for seven or eight years long; before which time, straw becomes musty and hard: they are thus used by divers persons of quality in Dauphiné; and, in Switzerland, I have sometimes lain on them to my very great refreshment. So as, of this tree it may properly be said, 'Silva domus, cubilia frondes.' *Juv.* The wood as house, the leaves a bed." (*Ibid.*, i. p. 137.) "We can," says Sir Thomas Dick Lauder, after quoting this passage, "from our own experience, bear testimony to the truth of what Evelyn says here, as to the excellence of beech leaves for mattresses. We used always to think that the most luxurious and refreshing bed was that which prevails universally in Italy, and which consists of an absolute pile of mattresses filled with the elastic spathe of the Indian corn; which beds have the advantage of being soft, as well as elastic; and we have always found the sleep enjoyed on them to be peculiarly sound and restorative. But the beds made of beech leaves are really no whit behind them in these qualities, whilst the fragrant smell of green tea, which the leaves retain, is most gratifying. The objection to them is the slight crackling noise which the leaves occasion, as the individual turns in bed: but this is no inconvenience at all, or, if so in any degree, it is an inconvenience which is much overbalanced by the advantages of this most luxuriant couch." (*Laud. Gilp.*, i. p. 103.) As beech leaves are very long in decaying, they are valuable in gardening, for protecting herbaceous plants from frost, or mulching round the stems of half-hardy trees and shrubs.

The Catkins of the male Flowers, after they have dropped from the tree, are, at Claremont in Surrey, and some other places where the tree abounds, gathered by gardeners, dried, and laid up in a dry loft for packing fruit in, which is to be sent to a distance. They are also used for stuffing pillow-cases, cushions, &c.

The Fruit, the nut of which is called beech mast in England, and *la faine* in France, has a taste somewhat approaching to that of the hazel nut. It forms an excellent food for swine; but the flesh of those that have been fattened on it does not keep so well as that of swine which have been fed on acorns. The fat, also, is more oily, and, when boiled, is apt to waste in the pot. Beech mast is much sought after by wild animals, particularly by badgers, which it fattens

in a most extraordinary manner; and by squirrels and dormice, which last, Evelyn says, "harbouring in the hollow trees, grow so fat, that, in some countries abroad, they take infinite numbers of them, I suppose to eat. What relief they give to thrushes, blackbirds, fieldfares, and other birds, every body knows." (*Hunt. Evel.*, i. p. 137.) It is said greatly to improve the flavour of wild pigeons. In France, beech mast is much eaten by pheasants and partridges; and turkeys and other kinds of poultry are fattened by it in a very short time. In Britain, the only use, at present, made of this mast is by turning swine, deer, and poultry, into beech woods, to pick it up; but, in France, it forms a most important article of domestic consumption, for making oil. Beech oil is considered not only excellent for burning in lamps, but also for cooking, and especially for frying fish. The French cooks put a crust of bread into the pan with the oil, which they take out when it is sufficiently hot to put in the fish. The oil fries a fine brown; and, if it burns, does not produce a disagreeable smell, like that of other oils. The forests of Eu and of Crécy, in the department of the Oise, it is stated in the *Nouveau Du Hamel*, have yielded, in a single season, more than 2,000,000 bushels of mast; and Michaux adds that, in 1779, the forests of Compiègne near Verberie, department of the Somme, afforded oil enough to supply the wants of the district for more than half a century. In some parts of France, the nuts are roasted, to serve as a substitute for coffee.

Mode of making Beech Oil. When required for the table, this oil is prepared with great care, and is thought very little inferior to that of the olive. The nuts are first cleared from their shells by shaking them in sieves, and then winnowing them: they are next spread out to dry in some airy place, as the least mouldiness or appearance of germination in the nut will spoil it. The best time for extracting the oil is between December and March. The nuts are separated from their outer brown skin by heating in an oven, or before the fire, and then rubbing them with the hands; or by slightly bruising them in a mill, and then winnowing them. If labour is cheap, they may also be deprived of their inner skin, a very thin pellicle, which is very acrid. When blanched, they should, as soon as possible, be reduced into a paste by pounding them in a mortar, or by grinding them in a mill made on the principle of a coffee-mill. In either case, the implements employed must be perfectly clean, as the least particle of rancid oil will spoil the whole. Hot water is not sufficient to clean them, but alkaline ashes must be employed; after which they must be rinsed several times with pure water. When the nuts are reduced to a paste, a little water is put to them, which may be either cold or warm, according to the quality of the oil required; and they are then put into perfectly clean linen or hair cloths, and pressed very slowly, to prevent the oil from becoming clogged. When a very fine oil is wanted, cold water is used, and a low temperature; but, where it is wished to obtain a greater quantity, warm water is used, and the press is kept in a moderately warm temperature. After the first pressing, the mass, or *tourteau*, as it is called in France, is again bruised, and, more water being added, it is again pressed. The oil produced by the process of warm extraction is about a tenth part of the weight of the nuts: this oil is rendered very nearly, if not quite, equal in quality to that of the olive, by putting it into casks, or unglazed earthen vessels, and placing them in a cool cellar. At the end of two or three months, the oil is examined, and drawn off into fresh casks or vessels, leaving a considerable quantity of mucilage at the bottom. This process is repeated three times during the first year; after which the oil is put into Florence oil flasks, and buried in sand in a cellar. The flasks should be always kept upright, and the oil drawn off from the mucilage which it will deposit into fresh flasks every year. Thus treated, it will keep 10 years, and improves by keeping, at least during the first 5 or 6 years; beech oil, about 6 years old being reckoned the best. The *tourteaux*, or remains of the nuts, from which the best oil has been extracted, are given to swine, cows, and poultry, which fatten rapidly on them. A coarser oil, for burning, is made by grinding the mast without taking off the shells; and the

tourteaux from this oil, which are too hard and husky to be eaten, are used for making torches; and hence the name of *tourteau*, which is generally applied to a torch, or link, in France. In those districts of England where the beech tree abounds in natural forests, it might, perhaps, be worth while to make beech oil for private use, both as a substitute for olive oil, and for lamp oil. By steeping the mast in water for several hours, and afterwards kiln-drying them, both the outer husk and inner skin would probably be easily removed in a common flour-mill, or in some coarse portable mill; and the kernels might be ground in a finer mill previously to expressing the oil from them. To prevent disappointment, however, as to the quantity of oil produced, it must be recollected that the summers of England are less favourable to the oleaginous secretions of plants than those of France.

For useful Plantations, the beech is not highly prized; the tree not being of much value when young, not forming a permanent coppice-wood, and the bark being of little value. Beech of small size, or of short and crooked stem, Mathew observes, is the least valuable of all timber. On dry chalky soils, it may be planted as a timber tree; but here, as in many other cases where a straight clean trunk is wanted, the plants require to be drawn up, either by other trees of their own species, or by trees of a different species, which advance at nearly the same rate of growth; such, for example, as the sweet chestnut. The beech, however, succeeds best in plantations by itself; and, perhaps, there is no membranaceous-leaved tree which, in a wild state in forests, is found so little intermixed with other species. It is one of the worst of all trees for hedgerows, not only injuring the fence and the adjoining crops by the density of its shade; but its trunk, when grown in this situation, being neither long, clean, nor straight, is of little value except for fuel. Another disadvantage attending the beech, in hedgerows, is, that it does not resist the sea breeze; though, after a certain period of time, the beech tree, like most others in which the head has grown all to one side, has the power of throwing out branches on the opposite side; as has been beautifully illustrated by Mr. Davis of Portway, in the *Gardener's Magazine*, vol. iii. p. 256.; and the rationale of the process will be found generalised in our *Encyclopædia of Arboriculture*. In Normandy, Bosc informs us, it was formerly the custom to plant the beech round villages, in order to shelter them from storms; the tree, from the upright tendency of its branches, affording less leverage to the wind, and, by the bulk and compactness of its head, opposing a greater body to its progress, and thus producing more shelter.

As Undergrowth, the beech is not of long duration, seldom pushing from the stools after 40 or 50 years; owing, as it is supposed, to the extreme hardness which the bark acquires during that period. Even to preserve a beech coppice in vigour for any length of time, it is necessary to cut it more frequently than in the case of almost any other tree. In Buckinghamshire, which is almost the only county in England where there are extensive beech coppices, they are cut every sixth or seventh year, and the wood burned into charcoal, which is sold to the gunpowder manufacturers. In Germany, M. Hartig has found that the beech does not push nearly so well from the stool in rich as in poor soil; which, he conjectures, may be owing to the extraordinary thickness and hardness of the bark, produced by the exuberance of sap, which, as it were, prevents the bud formed by the germ from penetrating through it; in the same manner as a seed, when sown, if covered by a lump of hard soil, is prevented from coming up. For this reason, Hartig recommends beech coppices, on rich soils, to be cut when the sap is in motion; because the quantity of sap being diminished by the loss that is then sustained, the stool becomes more marly in the situation which it would be in if growing in a poor soil.

For Hedgerows for Shelter, and especially for those lofty narrow hedges which were formerly much in use for enclosing and sheltering gardens, orchards, and small fields for affording early grass, the beech has no equal among deciduous trees; for, as Boutcher observes, by retaining its withered leaves all the winter, it affords the same protection as an evergreen. A beech

hedge may be trained to a great height (even 30 ft. or 40 ft.), and still be kept quite narrow at the base, like the hornbeam: but beech is greatly superior to the hornbeam, in the richer colour of its foliage. In Belgium, particularly in the village of St. Nicholas, between Ghent and Antwerp, very close and handsome hedges are made with young beech trees, planted 7 in. or 8 in. apart, with their heads inclining in opposite directions, at an angle of 45°, so as to cross one another at right angles, and thus form a wall of trelliswork, the open squares of which are 5 in. or 6 in. on the side. During the first year, the plants are bound together with osiers at the points of intersection, where they finally become grafted, and grow together. Dr. Neill found a hedge of this sort 5 ft. high, between Conti and Mechlin, in 1817. (See *Journ. Hort. Tour.*, p. 270.)

As an ornamental Tree for the park and the lawn, especially near the mansion, the beech has many important advantages. Though its head is more compact and lumpish than that of the oak, the elm, or the ash, yet its lower branches hang down to the ground in more pliant and graceful forms than those of any of these trees. The points of these branches turn up with a curve, which, though not picturesque, has a character of its own, which will be found generally pleasing. The leaves are beautiful in every period of their existence: nothing can be finer than their transparent delicacy when expanding, and for some weeks afterwards. In summer, their smooth texture, and their deep yet lively green, are highly gratifying to the eye; and the warmth of their umber tint, when they hang on the trees during the winter season, as contrasted with the deep and solemn green of pines and firs, has a rich, striking, and most agreeable effect in landscape. Hence a few beech trees are very desirable on the margin of pine and fir woods, or among evergreens generally; more especially when the soil is somewhat good and moist; under which circumstances alone will full-grown beech trees retain their leaves during the winter. So desirable is the effect produced by the beech with its leaves on in the winter season, that when the trees, from age or any other cause, drop their leaves in autumn, we would recommend the substituting of young trees, which seldom fail to retain their leaves during winter, till they approach towards a timber size. It is certain, however, that some individual beeches are much more apt to retain their leaves through winter than others; for which reason a sufficient number of young trees ought to be planted, to allow of the rooting out of those which do not answer the end in view. Beech trees under 30 or 40 years' growth, when cut down to the ground, push up again; and the leaves on the shoots so produced seldom fail to remain on during the winter. Low growths of this sort will, in many cases, produce the desired effect as well as trees; a circumstance which may afford a useful hint to the possessors of grounds of limited extent.

The leaves of the beech are less liable to be eaten, either by insects or by cattle, than those of almost any other tree. The first circumstance renders the beech very desirable for situations near the eye, and for avenues and hedges; and the second renders it one of the best park trees, since its branches, though they are injured by cattle, are far less so than those of the oak and the elm. Two other circumstances which render this an excellent park tree are, the food which its mast affords to deer and squirrels, to peacocks and other ornamental poultry, and to pigeons, thrushes, blackbirds, and other birds. The density of its head makes it an excellent nightly shelter for singing birds. The smoothness and light colour of the bark, and the circumstance of the trunk being clothed with branches to within a short distance of the ground, render it a desirable tree to place a seat under; the eye feeling the light colour of the smooth bark to be more enlivening than the dark rough-furrowed bark of the oak or English elm, the dark smooth gloomy bark of the Scotch elm, the lichen-covered hoary bark of the ash, or the reddish brown, cracked, and scaly bark of the Scotch pine. The only tree which can be compared to the beech, as one to sit under, is the platanus; but the shade of this last tree is much less dense. The ancients

supposed the shade of the beech to be as wholesome, as that of the walnut was the reverse.

The purple beech, and the other varieties, are trees of singularity, which produce a striking effect when judiciously introduced among other scenes composed of foreign trees, and mark in an especial manner, wherever they are seen, the hand of art and refinement.

For the picturesque Properties of the Beech, we shall resort to our usual authority, Gilpin. "After timber trees," this author observes, "the beech deserves our notice. Some, indeed, rank the beech among timber trees; but, I believe, in general it does not find that respect, as its wood is of a soft spongy nature, sappy, and alluring to the worm. In point of picturesque beauty, I am not inclined to rank the beech much higher than in point of utility. Its skeleton, compared with that of the trees we have just examined, is very deficient. Its trunk, we allow, is often highly picturesque. It is studded with bold knobs and projections, and has sometimes a sort of irregular fluting about it, which is very characteristic. It has another peculiarity, also, which is sometimes pleasing, — that of a number of stems arising from the root. The bark, too, wears often a pleasing hue. It is naturally of a dingy olive; but it is always overspread, in patches, with a variety of mosses and lichens, which are commonly of a lighter tint in the upper parts, and of a deep velvet green towards the root. Its smoothness, also, contrasts agreeably with those rougher appendages. No bark tempts the lover so much to make it the depository of his mistress's name. It conveys a happy emblem: — 'Crescent illæ; crescetis amores.' In a chequered grove, we sometimes see very beautiful effects produced by the brilliant sparkling lights which are caught by the stems of beeches: but, having praised the trunk, we can praise no other part of the skeleton. The branches are fantastically wreathed, and disproportioned, twining awkwardly among each other, and running often into long unvaried lines, without any of that strength and firmness which we admire in the oak, or of that easy simplicity which pleases us in the ash: in short, we rarely see a beech well ramified. In full leaf, it is equally unpleasing: it has the appearance of an overgrown bush. Virgil, indeed, was right in choosing the beech for its shade: no tree forms so complete a roof. If you wish either for shade or shelter, you will find it best 'patulæ sub tegmine fagi.' This bushiness gives a great heaviness to the tree, which is always a deformity. What lightness it has disgusts. You will sometimes see a light branch issuing from a heavy mass; and, though such pendent branches are often beautiful in themselves, they are seldom in harmony with the tree. They distinguish, however, its character, which will be seen best by comparing it with the elm. The elm forms a rounder, the beech a more pointed, foliage; but the former is always in harmony with itself. Sometimes, however, we see in beeches of happy composition the foliage falling in large flocks, or layers, elegantly determined; between which the shadows have a very forcible effect, especially when the tree is strongly illumined. On the whole, however, the massy, full-grown, luxuriant beech is rather a displeasing tree. It is made up of littlenesses, seldom exhibiting those tufted cups, or hollow dark recesses, which disport in the several grand branches of the beautiful kind of trees. Contrary to the general nature of trees, the beech is most pleasing in its juvenile state, as it has not yet acquired that heaviness which is its most faulty distinction. A light, airy, young beech, with its spiry branches hanging, as I have just described them, in easy forms, is often beautiful. I have seen, also, the forest beech, in a dry hungry soil, preserve the lightness of youth in the maturity of age. After all, however, we mean not to repudiate even the heavy luxuriant beech in picturesque composition. It has sometimes its beauty, and oftener its use. In distance, it preserves the depth of the forest; and even on the spot, in contrast, it is frequently a choice accompaniment. We call a forest deep when we cannot see through it; so that, at a distance, a thin wood of beeches will have the effect of a large one. In the corner of a landscape, when we want a thick heavy tree, or a part of one at least, which is often

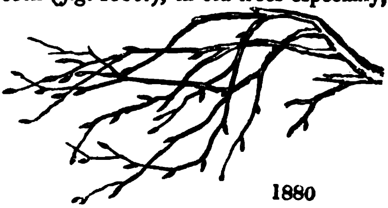
necessary, nothing answers our purpose like the beech. But, at present, we are not considering the beech in composition, but only as an individual; and in this light it is in which we chiefly conceive it as an object of disapprobation.

"We should not conclude our remarks on the beech without mentioning its autumnal hues. In this respect it is often beautiful. Sometimes it is dressed in modest brown, but generally in glowing orange; and in both dresses its harmony with the grove is pleasing. About the end of September, when the leaf begins to change, it makes a happy contrast with the oak, whose foliage is yet verdant. Some of the finest oppositions of tint which, perhaps, the forest can furnish arise from the union of oak and beech. We often see a wonderful effect from this combination: and yet, accommodating as its leaf is in landscape, on handling, it feels as if it were fabricated with metallic rigour. In its autumnal state, it almost crackles: — 'Leni crepitabat bractea vento." For this reason, I suppose, as its rigour gives it an elastic quality, the common people in France and Switzerland use it for their beds. I have dwelt the longer on the beech, as, notwithstanding my severity, it is a tree of picturesque fame; and I did not choose to condemn it without giving my reasons. It has acquired its reputation, I suppose, chiefly from its having a peculiar character; and this, with all its defects, it certainly has. I may add also, that, if objects receive merit from their associated, as well as from their intrinsic, qualities, the dry soil and salubrious air in which the beech generally flourishes, give it a high degree of estimation." (*Gilp. For. Scen.*, vol. i. p. 50.)

"The spray of the beech," Gilpin continues, "observes the same kind of alternacy as that of the elm; but it shoots in angles still more acute (*fig.* 1879.); the distance between each twig is wider; and it forms a kind of zigzag course. We esteem the beech also, in some degree, a pendent tree, as well as the ash; but there is a wide difference between them. The ash is a light airy tree, and its spray hangs in loose elegant foliage; but the hanging spray of the beech (*fig.* 1880.), in old trees especially, is often twisted, and intermingled disagreeably; and has a perplexed matted appearance. The whole tree gives us something of the idea of an entangled head of bushy hair, from which, here and there, hangs a disorderly lock; while the spray of the ash, like hair neither neglected nor finically nice, has nothing squalid in it, and yet hangs in loose and easy curls." (*Ibid.*, p. 114.) If an ordinary old beech tree gives the idea of an entangled head of hair, the inosculated beech at Westbury (*figs.* 1881. and 1884.), may be compared to a head of hair affected with the plica polonica.



1879



1880

On Gilpin's observations on the beech, Sir T. D. Lauder justly observes, that they afford "one of the instances in which the author's love for the art of representing the objects of nature with the pencil, and his associations with the pleasures of that art, have very much led him astray. We are disposed to go along with him in a great measure, so far as we, like him, draw our associations with this tree from the same source. But we conceive we have much the advantage of him, in being able to indulge in the pleasures arising from the contemplation of a noble beech as one of the most magnificent objects of God's fair creation. Some of the very circumstances which render it unpicturesque, or, in other words, which render it an unmanageable subject of art, highly contribute to render it beautiful. The glazed surface of the leaf, which brightly reflects the sun's rays, and the gentle emotions of light, if we may venture so to express ourselves, which sometimes steal over the surface of its foliage with the breathing of the balmy breeze, although difficult, or

rather almost impossible, to be represented by the artist, are accidents which are productive of very pleasing ideas in the mind of the feeling observer of nature. 'They make spreading trees and noble shades,' says old Evelyn, 'with their well-furnished and glittering leaves, being set at 40 ft. distance. But they grow taller, and more upright, in the forests, where I have beheld them, at 8 ft. and 10 ft., shoot into very long poles; but neither so apt for timber nor fuel. In the valleys, where they stand nearest in consort, they will grow to a stupendous procerity, though the soil be stony and very barren; also upon the declivities, sides, and tops of hills.' We remember to have been much gratified with the effect of this tree, where all other trees were absent: it was in Italy, on the very summit of the Valombrosan Apennine. During our progress through the scorching plains of Italy (nay, we may safely say, after bidding adieu to England), we had seen nothing to resemble the green sward of a British lawn. What was our agreeable surprise, then, when, on emerging from the upper boundary of those forests of chestnut and other trees which there cover the declivities of the mountains, we entered at last on a beautiful sloping and undulating lawn, composed of shaven turf of the richest possible verdure, every where surrounded by fine spreading beeches, running into the open ground in irregular promontories, and receding in bays, in which the velvet surface of the pasture stole gradually into the cool shade! The whole was like a scene of magic. It was like a perfect and well-kept English park; and this produced by the enchanting hand of nature, on the summit of the Apennines. We selected the most pleasing spot we could find on the very top; and there, under the umbrageous cover of one of the largest trees, we eat our well-earned meal, where the boundless prospect gave to our wondering and delighted eyes, the view of the waters of the Mediterranean on the one side, and those of the Adriatic on the other. We must confess, that we have hardly ever seen a beech tree since, without its bringing to our recollection the enjoyments of that most celestial day; and the reader will easily be able to trace the combination of pleasing associations which made it so." (*Lauder's Gilpin*, vol. i. p. 101.)

Soil and Situation. The beech will grow on dry soils, including sand, gravel, and chalk, more freely than most other trees; though it is found in the greatest perfection in sandy calcareous loam or in fresh sandy loam on clay or rock. On both sandy and clayey soils, it sometimes becomes a tree of great magnitude, as in the case of the beech at Knowle, in Kent, which grows in pure sand, and which is 105 ft. high, with a head 123 ft. in diameter; and the avenues at Panmure, in Forfarshire, on clayey loam, where, Mr. Sang informs us, there are specimens 90 ft. high, with clear trunks of upwards of 50 ft. Among rocks, crags, and where there is little or no soil to be seen, and in low situations by the banks of streams, Sang informs us that the beech will grow to a vast and very uncommon size. It will thrive in elevated situations, but is not found at so great a height as the sycamore, or even the oak. (See *Geography, &c.*, p. 1955.)

Propagation and Culture. The species is universally propagated by seed, and the varieties by budding, grafting, or inarching. The seeds or nuts, which are commonly called mast, begin to drop from the husks in the months of October and November; and this process may be accelerated by shaking the tree. The nuts may then be gathered up, and dried in the sun, or in an airy shed or loft; after which, they may be mixed with sand that is perfectly dry, at the rate of three bushels of sand to one of mast. French authors direct that the sand in which the mast is kept should be slightly watered once a month; which shows in a striking manner the difference as to dryness between the climate of France and that of England. By some, the mast is spread in a thin stratum on a loft floor, without any sand; where it remains, being occasionally turned over, till the following spring, and being covered with straw to exclude the frost. The mast only retains its vital properties for one year; and, therefore, it must be sown, at the latest, during the following spring. The common time is from the beginning

of March till the beginning of April. Autumn might be adopted for sowing, were it not that the nuts are greedily sought after, through the winter, by mice and other vermin. One bushel of seed, according to Mitchell, weighs 34 lb. unheaped, and contains 58,656 seeds. From 1½ bushel of seeds, the produce of the year 1786, kept in sand till the following spring, not less than 150,000 plants were raised, and planted on the Muirland Hills, at Dillorn, Staffordshire, by J. Halliday, Esq., who received a gold medal for so doing. (*Trans. Soc. Arts*, vol. x., for 1792, p. 18.) The soil in which the nuts are sown ought always to be light, and more or less rich, as the plants are rather tender when young. They may either be sown in beds, or in drills, with the usual covering of soil, being about 1 in. The seeds should not lie nearer to one another, when sown, than 1 in. Mast, sown in the autumn, will come up in April; and that sown in spring, seldom later than the beginning of May. Boutcher sows in the beginning of March, in thin shallow drills, about 1 ft. 6 in. asunder; watering, if the season is dry, frequently, but moderately, from the plants beginning to appear above ground, till the middle of August; which, he says, greatly forwards their growth. "In March, next season, with a spade made very sharp for the purpose, undermine the roots as they stand in the drills, and cut them over between 4 in. or 5 in. under ground. The following autumn or spring, you may either raise the whole, or give them another cutting below ground; when, gently raising such as are too thick, leave the remainder, at proper distances, to stand another season. This manner of cutting the roots dexterously has, in a great measure, the same effect as transplanting." (*Treatise*, &c., p. 22.) After the plants have stood 2 years, or, if in poor soil, 3 years, they may be transplanted in lines 2 ft. asunder, and 9 in. or 10 in. in the line. A great error in treating the beech tree at this age, Boutcher observes, is trimming off all its side branches, and planting only the bare stem. This, he says, is doing the greatest violence to the plants, as no tree admits of being less pruned at transplanting than the beech, especially when young; the plants "constantly turning hide-bound and stunted when that is severely done;" therefore, nothing but "very cross ill-placed branches, and even these very sparingly, are to be touched at this time." After the plants have remained in these lines 2 years, they are to be removed into other lines, 3 ft. 6 in. asunder, and at 1 ft. 6 in. apart in the line; whence, after remaining in good soil 3, but in poor land 4, years, they may either be removed into a general plantation, where they are to remain permanently, or, if they are to be transplanted from the nursery of a large size, they must undergo the further discipline of being once, twice, or thrice transplanted, till at last they stand 10 ft. asunder every way. During the whole of this treatment, they must scarcely receive any pruning, except in the season before final removal. At their removal they must not be pruned at all; but, when once established, they may be pruned at pleasure, as every beech hedge and beech coppice shows. In respect to the latter, indeed, a common expression in Buckinghamshire is, "Cut a beech, and have a beech."

Final Culture in Plantations. The beech, after being transplanted where it is finally to remain, if in masses, and the plants not above 3 ft. or 4 ft. high, may be cut down to the ground, and the leading shoot produced the following year selected, and trained so as to form a clear stem. It has been found, from experience, that trees of 20 years' or 30 years' growth, when transplanted, suffer much by pruning at that time, and cannot have their heads cut in, like the oak, the elm, and almost every other species of deciduous membranaceous-leaved trees, when they are transplanted of large size. They may, however, be cut in a year or two years before removal, and will, in that case, transplant with a much better chance of success. Where a beech wood is to be formed on a light poor soil, provided the surface admits of being pulverised by the plough and harrow, or of being trenched, it may be sown with mast in drills, without the admixture of the seeds of any other tree. The ground may be cultivated, for two or three years, between the rows, by horse-hoeing; and the plants may be thinned out the second year, so as to stand at 6 ft. apart in

the row. If the rows are 6 ft. asunder, the plantation will form a very suitable coppice for cutting every seventh year; or, if every tenth plant be permitted to become a timber tree, the result will be a beech wood, with ample spaces between the trees for the growth of coppice.

Felling the Beech for Timber, the successional Trees, &c. As full-grown trees do not stole, they are generally taken up by the roots. The usual season is winter; though some French authors assert that the English practice is to fell beech trees in the beginning of summer, when the sap is in full motion. In Buckinghamshire, beech woods have been succeeded by beech woods from time immemorial; the mast which has dropped from the trees springing up, and supplying the place of those that are removed. In artificial culture, however, a different natural order of trees, it would seem, ought to be made to succeed the beech; though, on very thin soils on chalk, it would be difficult, if not impossible, to name a tree that would produce an equal bulk of timber in the same number of years, independently altogether of the value of its timber. It is certain, that none of the poplars, beeches, or willows, would do this; nor will any of the pines or firs thrive where the subsoil is chalk. Where, however, the soil is deeper than it is in Buckinghamshire, the theory of a succession of a timber crop may, perhaps, be advantageously carried into execution; but the beech, on a thin surface of vegetable soil on chalk, seems to be an exception: or, perhaps, several crops may be taken on such soils, and, consequently, several generations elapse, before a change of crop is required.

Accidents, Diseases, &c. The full-grown beech, from the acuteness of the angle which the branches form with the trunk, presents, as we have already mentioned (p. 1954.), less leverage to the wind than the branches of many other trees, and is, consequently, liable to few accidents from storms. Large detached trees, when of a great age, are, like all others under similar circumstances, liable to be blown down; but, in general, few trees are seen more perfect in their form than the beech. It is subject to few diseases, unless we except that tufted appearance named Eríneum *fagíneum Pers., Grev. Crypt.*, t. 250., which is sometimes found on the leaves, and which some botanists consider to be a fungus; but which the Rev. M. J. Berkeley considers a disease produced by a surorganisation of the cellular tissue. The trunk and branches of the beech are subject to nodosities, seldom above 1 in. or 2 in. in diameter, but which sometimes are much larger. These are probably originated by the puncture of some insect, and are to the wood of the beech what the galls of the oak are to the leaves of that tree. The branches from their number, proximity, and liability to cross each other, may occasionally be found inosculated; and a remarkable example of this occurs in a wood called West Hay, between Cliff and Stamford, belonging to the Marquess of Exeter. We are indebted, for a knowledge of this tree, to the kindness of the Rev. M. J. Berkeley; and to Mrs. Berkeley for the very beautiful and accurate drawings from which *figs.* 1881. and 1884. are engraved. *Fig.* 1881. is to our usual scale for full-grown trees of 1 in. to 12 ft.; and *fig.* 1884. in p. 1972., which shows a portion of the trunk, is to a scale of 2 ft. 6 in. to 1 in.

The only *quadrupeds* that we are aware of, that do much injury to the beech, are deer and cattle pasturing round them, which, however, as before observed, crop their branches much less than they do those of most other trees; and the squirrel, which, however, is most injurious to young beech trees, by feeding on the inner bark. These animals appear to prefer the bark on the lower part of the tree, as, indeed, do rats, mice, and most animals that gnaw through stems of young trees. The squirrel, however, when pressed for food, will attack both the beech and hornbeam, when the trees are of considerable size, stripping off the outer bark in pieces of from 3 in. to 6 in. in length; and then feeding on the inner bark and the soft wood. It has been found that coating the stems of trees for 5 ft. or 6 ft. in height, with a mixture of tar and grease, will deter the squirrels from attacking them.

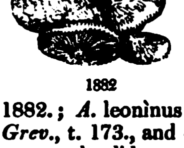
Insects. Comparatively few insects attack the beech, and those which do chiefly belong to the order Lepidóptera, and are in the caterpillar state. Of these the following are the most interesting species: — Staúropus fàgi (the lobster),

1881

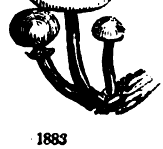


Notodónta dromedàrius, Lophópteryx camelìna, Petàsia cassínea, E'ndromis versícolor (Glory of Kent moth), Aglàia taú; all belonging to the Linnæan *Bómbyces*. Amongst the *Noctùidæ* are, Orthòsia stábilis, Misèlia aprilìna, Catocàla fráxini; and, amongst the Geométridæ, Hímera pennària, Epìone vespertària, Lobóphora hexapteràta, together with Drépana unguícula and Hylóphila prasinària. One of the gall flies, also, (Cỳnips fàgi) attacks the leaves of *Fàgus* sylvática, forming galls upon them; and *Psýlla* fàgi *Linn.*, also, feeds upon the leaves, occasionally in such numbers as to cause them to appear covered with white flakes of wool or cotton; the larvæ and pupæ being clothed with a long downy secretion, perfectly white. (*Réaum. Mém.*, tom. iii. pl. 26. fig. 1—6.)

The Fúngi which grow upon the Beech, in Great Britain, are rather numerous, and the following list of them has been kindly sent to us by the Rev. M. J. Berkeley :—



1882



1883

Those upon the Bark, Wood, or fallen Branches, are: *Agáricus* mùcidus *Schrad.*, syn. *A.* nítidus *Fl. Dan.*, t. 773., and our *fig.* 1893.; *A.* salígnus *Pers.*; *A.* mastrucàtus *Fr.*, syn. *A.* echinàtus *Sow.*, t. 99., and our *fig.* 1882.; *A.* leonìnus *Schæff.*, t. 48.; *A.* phlebóphorus *Ditm.*, *Grev.*, t. 173., and our *fig.* 1885.; *A.* adipòsus *Batsch*, a most splendid species, the pileus of which, in fine speci-



1884



1885

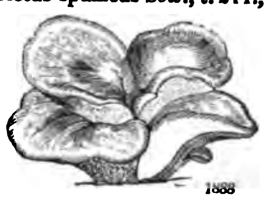


1886

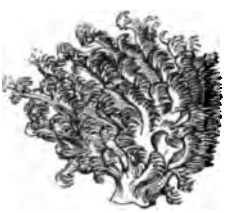
mens, bears a strong resemblance to a well-grown pine-apple; *A.* bombýcinus *Schæff.*, t. 98., is also found on the beech, though this species is most frequent, in England, on the ash; Dædàlea gibbòsa *Pers.*, syn. *B*olètus sinuòsus *Sow.*, t. 194., and our *fig.* 1886.; D. latíssima *Fr.*, syn. *B*olètus resupinàtus *Sow.*, t. 424.; Polýporus brumàlis *Fr.*, *H*elvélla píleus *Schæff.*, t. 281., and our *fig.* 1887.; P. gigantèus *Fr.*, syn. *B*olètus imbricàtus *Sow.*, t. 86., and our *fig.* 1888., forming masses 2 ft. or 3 ft., or more, across, at the base of the trunks; P. cristàtus *Fr.*; P. spùmeus *Fr.*, syn. *B*olètus spùmeus *Sow.*, t. 211., and P. conchàtus *Fr.* (which last, though found on the beech, is more common on the sallow). *H*ýdnum corallöìdes *Scop.*, *Sow.*, t. 252., and our *fig.* 1889., is one of the most beautiful of Fúngi, resembling, according to some authors, a cauliflower: like *H*ýdnum Erinàceus, it is esculent. Phlèbia merismöìdes *Fr.*, *Grev.*, t. 280.; Pezìza repánda *Wahl.*, *Grev.*, t. 59.; P. melástoma *Sow.*, t. 149., syn. P. àtro-rùfa *Grev.*, t. 315., and our *fig.* 1890.; *P.* anómala *Pers.*, *P.* rugòsa *Sow.*, t. 369.; *P.* aurèlia *Pers.*, *Grev.*, t. 139., and *P.* æruginòsa *Pers.* *Grev.*, t. 241., syn. *H*elvélla æruginòsa *Sow.*, t. 347. and our *fig.* 1901. "The wood on which it grows is almost always stained with the same green colour as the fungus." (*Sow.*, l. c.) Cryptómyces versícolor *Berk.*, syn. Stíctis versícolor *Fr.*; Scleròtium truncòrum *Tode*, forming a nidus to *Ag.* tuberòsus; Sphæ'ria fragifórmis *Pers.*, syn. Stromatosphæ'ria *Grev.*, t. 136., Lycopérdon variolòsum *Sow.*, t. 271., and our *fig.* 1902.; S. cohæ'rens *Pers.*; S. rùfa *Pers.*, S. deústa *Hoffm.*, syn. Stromatosphæ'ria deústa *Grev.*, t. 324., and our *fig.* 1903.; S. máxima *Sow.*, t. 338; S. discifórmis *Hoffm.*, syn. Stromatosphæ'ria discifórmis *Grev.*, t. 314., and our *fig.* 1894.; S. depréssa *Sow.*, t. 216.; S. áspera *Fr.*; S. angulàta *Fr.*; S. túrgida *Pers.*; S. quaternàta *Pers.*; S. gyròsa *Schwein.*, syn. S. flùens *Sow.*, t. 423.; S. melográmma *Pers.*; S. trístis *Tode*; S. *P*ezìza *Tode*, *Grev.*, t. 186., and our *fig.* 1895.; *P*eziza hydróphora *Sow.*, t. 23.; Hystèrium rugòsum *Fr.*, syn. Opégrapha epiphèga *E. B.* t. 2282., and our *fig.* 1897.; Reticulària máxima *Fr.*, syn. Lycop. echinifórmis *Sow.*, t. 400. f. 1. The sporidia, when subjected to considerable heat by Dr. Wollaston, produced a phosphoric glass. (*Eng. Fl.*, vol. v. pt. 2. p. 308.) Stílbum turbinàtum *Tode*, S. vulgàre *Tode*, and our *fig.* 1896.; Corýneum macrospòrium *Berk.*; Næmáspora cròcea *Pers.*; Stilbóspora asterospérma *Pers.*



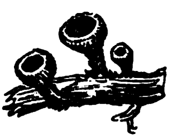
1887



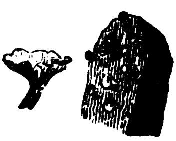
1888



1889



1890



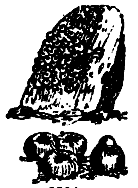
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1892

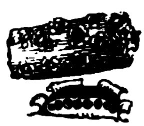


1893

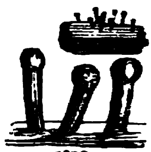


1894

The Fúngi on the Leaves of the Beech are: Agáricus capillàris *Schum.*; *A.* setòsus *Sow.*, t. 302.; *P*ezìza epiphýlla *Pers.*; Sphæ'ria artócreas *Tode*; Cratèrium leucocéphalum *Ditm.*, *Grev.*, t. 65., and our *fig.* 1898.



1895



1896

The F*úngi growing on Beech Mast* are: *Agáricus* balanìnus *Berk.*; *Pezìza* fructígena *Bull.*, *Sow.*, t. 117. and our *fig.* 1900.; Sphæ'ria carpóphila *Pers.*: and, of those found attached to the root, Mr. Berkeley only mentions Elaphómyces muricàtus, syn. Lycopérdon Tùber *L.*

The most remarkable F*úngi growing beneath the Beech Tree*, or among its fallen leaves, in British woods, are: Geoglóssum víride *Fr.*, *Grev.*, t. 211., and our *fig.* 1899.; A'nthina flámmea *Fr.*, found abundantly in Rockingham and Sherwood Forests, in 1836; *Morchella* esculénta *Pers.*, *Grev.*, t. 68., syn. *H*elvélla esculénta *Sow.*, t. 51., in part, and our *fig.* 1902.; and *T*ùber cibàrium *Sibth.*, *Sow.* t. 309., and our *fig.* 1901. Of these the last two are celebrated luxuries for the table. *Morchélla* esculénta *Pers.*, the common morel, is a mushroom-like fungus, growing in great abundance in the woods of Germany and France, particularly after any of the trees have been burned down. This having been observed, led, in Germany, to the burning of the woods, in order to produce morels; and, consequently, great numbers of trees were destroyed, till the practice was forbidden by law. This fungus is much used, also, in a dried state, for giving a flavour to made dishes; and, in the countries where it abounds, many persons gain their livelihood by finding and drying the morels, which they do by running a thread through their stalks, and hanging them in an airy place. In England, morels are comparatively rare; but Mr. Berkeley informs us that he has known them to be so abundant in Kent, as to be used for making a sort of catsup. There are many variations of form and size observable in this fungus; but *M.* esculénta *Pers.* (*fig.* 1902.) and *M.* pátula (*fig.* 1903.) are generally considered the best. When young and fresh, the morels are of a greyish brown, and have an agreeable smell; but, when old, they become nearly black, and lose their fragrance. In the latter state they are not fit for the table; because the cup is generally found much perforated, and full of the larvæ and eggs of insects. When dry, morels will keep good, and retain their flavour, for many years. The morel is always found in the spring, and is thus easily distinguished from the helvella, which is often used as a substitute for it, but which is generally found in autumn. *H*elvélla esculénta (our *fig.* 1904.) has a good flavour, but is far inferior to the genuine morel: it is, however, often confounded with it in Sweden, under the name of stenmurkla, and, in Germany, under those of gemeine morchel, stumpf morchel, and stock morchel. (See *Dict. Class.*, &c., and *Nouv. Cours d'Agri.*, art. Morille.) *T*ùber cibàrium (*fig.* 1901.), the common truffle, is, if possible, even more highly prized in cookery than the morel: it is also more difficult to find, as, instead of appearing above the surface, like a mushroom, it is buried in the ground, like a potato. It is black, covered with tubercles, and possesses a very strong but agreeable smell. When ripe, its flesh is brown, veined with white. It is generally found by dogs or pigs, trained to search

1897





1898



1899

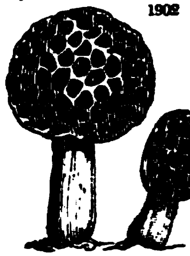


1900



1901

1902

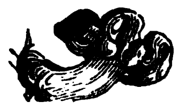


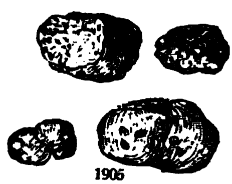
for it; but, in those countries where truffles abound, in the month of October (which is their season for ripening), all the inhabitants repair to the woods, slightly stirring, or rather scratching, the ground in those places which experience points out to them as the most likely to contain the tubers. The high price of, and constant demand for, truffles, both in France and other countries, render this a very lucrative employment; and experienced hunters are rarely deceived in the places where they make their search. Nees von Esenbeck relates an instance of a poor crippled boy who could detect truffles with a certainty superior even to that of the best dogs, and so earned a livelihood. (*Eng. Fl.*, vol. v. p. 288.) Truffles are generally found, in France, in light dry soils, and particularly in forests on mountains. They are most abundant in the vicinity of Grenoble, Avignon, Périgueux, and Angoulême; and on the mountains of Vivarais, Cevennes, and Jura. In England, they are tolerably abundant in beech woods on light soil; but they are very rare in Scotland. The truffles of commerce are generally those of Angoulême and Périgueux. The signs which are considered, in France, to indicate the habitats of truffles are: 1. The absence of plants on the surface of the ground; the quantity of nourishment required by the truffle generally famishing their roots. 2. The cracking and undulations of the surface of the soil, which appears as though it had been slightly raised by moles, or some other animal under ground, in little hillocks, which are generally very small, being seldom larger than a common hen's egg; where they are much raised, the truffle is generally found only 2 in. or 3 in. below the surface. 3. The appearance of numerous columns of small flies, which are attracted by the smell of the truffle, and seek it in order to deposit their eggs. Pigs are so fond of truffles, whenever they have once tasted them, that, when they find them, though they are muzzled, they keep rooting up the earth with their snouts, and are quite insensible to the calls of their masters, to whom they are perfectly obedient at all other times. Many persons have attempted to propagate truffles artificially; and Bulliard and Baril have, to a certain extent, succeeded, but not sufficiently to make the culture of the root become general. The mode of propagation employed was, taking the earth up in places where truffles were generally found, in the month of May, when the first traces of them were discoverable; and, after placing this earth in a garden, covering it with decayed beech leaves, which were shaded and kept moist, in order to imitate the temperature of the natural habitat of the tuber. In this manner truffles were produced, but neither in greater abundance, nor of better quality, than in their native woods; and the trouble and expense of rearing them was considerable. Other methods have been tried in Germany, as noticed in Bornholz's *Trüfflebau*, &c. (see *Gard. Mag.*, vol. ii. p. 480.); and the culture has even been undertaken in England, though without success. (See *Gard. Mag.*, vol. iii. p. 102.) Truffles are often preyed upon by a species of Leiòdes. They are very difficult to keep, and they are seldom good more than ten days or a fortnight. The best way of keeping them entire is, to leave them in the earth in which they are found till they are wanted for the table, or to bury them in sand immediately on taking them out of the ground; by which last method it is said to be possible to keep them two or three months. The most general way of keeping them is, however, to cut them into very thin slices, and either to dry them in an oven, or fry them in oil, and then preserve them in waxed paper or glass bottles. Truffles are never eaten raw: when fresh, they are cooked like mushrooms; or capons or turkeys are stuffed with them: but they are principally used dry for flavouring *ragoûts*, and other made dishes. It is said that a spirituous liquor may be extracted from them. (See *Nouv. Cours d'Agri.*, art. Truffle noire; Fischer's *Anleit. zur Trüfflejagd*, &c.; Bornholz *Der Trüfflebau*, &c.; Bulliard's *Hist. des Champ. de*



1903

1904





1905

France; Roque's *Hist. des Champ.;* &c.) Rhizopògon álbus *Fr., Berk. Eng. Fl.*, v. part 11. p. 229. syn. *T*ùber álbum *Bull.*, t. 404., *Sow.*, t. 310., and our *fig.* 1815.; *T.* álbidum *Cæsalp.*; Lycopérdon gibbòsum *Dicks. Crypt.*, ii. p. 26.; Truffle blanche, *Fr.*; the White Truffle; is also eaten. It is rare both in France and England; but is sometimes found, in both countries, in sandy woods, and is common in Germany. It has occurred in the Botanic Garden at Glasgow.

The price of morels, dry, in Covent Garden market, varies from 16*s.* a pound to 20*s.*; and in Paris the fresh morels are from 50 to 60 cents the pottle. Truffles, when dry, are about 14*s.* a pound in Covent Garden market; and fresh English truffles are from 3*s.* 6*d.* to 5*s.* a pound. Fresh truffles vary in Paris, according to their quality, from 50 cents to 3 francs per pound.



1906

Lichens. We are informed by W. Borrer, Esq., tht the only lichens known to him, as peculiar to the beech, are, Opégrapha venòsa and Parmèlia speciòsa. O. venòsa *Eng. Bot.*, t. 2454., and our *fig.* 1816., is found on the trunks of beech trees in the New Forest, Hampshire. Sir J. E. Smith describes the ramifications of this lichen as being "deeply sunk into the crust, but convex above, and intensely black, with obtuse terminations." (See *Eng. Fl.*, v. pl. 1. p. 148.) The name of Opégrapha alludes to the supposed resemblance of the lichens which compose this genus to Hebrew characters inscribed on the wood. P. speciòsa *Ach. Syn.*, p. 221., *L*ìchen speciòsus *Wulf. Eng. Bot.*, 1979., the elegant garland parmelia, is usually found on rocks; but Mr. Borrer informs us that it is also found on the beech. "The fructification of this lichen has not been found in Great Britain; but it is described from specimens gathered in North America." (*Eng. Fl.*, v. pl. 1. p. 202.) Dr. Taylor, however, finds it "not very rare near Dunkerron, county of Kerry." (*Fl. Hib.*, pt. ii. p. 149.); and a single specimen has occurred in St. Leonard's Forest, Sussex.

Statistics. Recorded Trees. The Great Beech, in Windsor Forest, of which an engraving is given by Strutt in his *Sylva Britannica*, and of which our *fig.* 1907. is a copy, reduced to a scale of 1 in. to 50 ft., is evidently of very great antiquity. It is supposed to have existed before the Norman Conquest; and it is mentioned by Cambden as "standing on a high hill (Sunning Hill), and overlooking a vale lying out far and wide; garnished with corn fields, flourishing with meadows, decked with groves on either side, and watered with the Thames." According to Jesse, the trunk of this tree measures, at 6 ft. from the ground, 36 ft. round. "It is now," he says, "protected from injury, and Nature seems to be doing her best towards repairing the damage which its exposure to the attacks of man and beast had produced. It must once have been almost hollow; but the vacuity (as shown in *fig.* 1908.), has now been nearly filled up. One might almost fancy that liquid wood, which had afterwards hardened, had been poured into the tree. The twistings and distortions of this huge substance have a curious and striking effect; and one might almost imagine them to have been produced by a convulsive throe of nature. (See *fig.* 1907. in p. 1977., on a larger scale, copied from *Jesse's Gleanings.*) There is no bark on this extraneous substance; but the surface is smooth, hard, and without any appearance of decay." (*Jesse's Gleanings in Nat. Hist.*, 2d s., p. 112.) A beech at Bicton, in Devonshire, blown down in 1806, had a trunk which measured 29 ft. in circumference, and a head which was 105 ft. in diameter. The Burnham Beeches stand in a tract of woodland above 4 miles from Stoke Pogis, in Buckinghamshire, which is celebrated as the scene of Gray's poetic musings. "Both vale and hill," says Gray, "are covered with most venerable beeches;" and in his *Elegy* he particularly mentions "the nodding beech, that wreathes its old fantastic roots so high." In Scotland, a very large beech stood at Newbattle Abbey, in Mid-Lothian. It was measured by Dr. Walker, in 1789; when the trunk was found to be 17 ft. in circumference, and the diameter of the head 89 ft. It contained upwards of 1000 ft. of timber. It was blown down by a gale of wind about 1809. Dr. Walker thinks it must have been planted between 1540 and 1560. A beech tree at Preston Hall, Mid-Lothian, at 1 ft. from the ground, measured 17 ft. 3 in. in circumference; and at 4 ft., 14 ft. 6 in. A beech at Taymouth, seemingly coeval with that at Newbattle Abbey, was blown down when its trunk was above 16 ft. round. A number of other fine beech trees, which existed in Scotland in the time of Dr. Walker, are noticed in his *Essays on Natural History*, to which Mr. Sang and Sir T. Dick Lauder have added several other remarkable examples. In Ireland, there are a number of large beech trees, the dimensions of which have been recorded by Hayes. At Shelton Abbey, near Arklow, there are 7 beech trees, the trunks of which measure from 13 ft. 9 in. to 15 ft. in circumference; and there are upwards



1907

of 60 trees with trunks between 10 ft. and 16 ft. in circumference, carrying the above girts for more than 40 ft. At Tiny Park there are 3 beech trees, with trunks 14 ft., 15 ft. 6 in., and 14 ft. 8 in. in circumference at the ground. The last, at 7 ft. from the ground, measures 16 ft. 3 in. round, and continues nearly of the same dimensions for 36 ft. The dimensions of various other fine trees might be added from the same authority. In France, a beech is recorded by Arthur Young (*Travels*, p. 7.) as standing at Chantilly, and the finest, he says, that he ever saw: its trunk was as straight as an arrow, not less than 80 ft. or 90 ft. high, 40 ft. to the first branch, and 12 ft. diam. at 5 ft. from the ground.



1908

Remarkable existing Trees. The largest beeches now existing in England are, the Studley Beech (see *fig.* 1878.), the Knowle Beech (see p. 1968.), 85 ft. high, diameter of the trunk 8 ft. 4 in., and of the head 352 ft., and the Ashridge Beeches; of which the Queen Beech (*fig.* 1909.) is 110 ft. high, the trunk is 10 ft. in circumference at 2 ft. from the ground, and at the height of 74 ft. from the ground, to which height the trunk is without a single branch, it is 6 ft. 3 in. in circumference. The King Beech, also in the park at Ashridge, and which is represented by the central tree in the group (*fig.* 1920.), is 114 ft. high, with a clear trunk of 75 ft., which, at 2 ft. from the ground, is 9 ft. in circumference, and at 75 ft., 5 ft. 6 in. A spreading beech at Ashridge (*fig.* 1911.) is 70 ft. high, with a trunk 18 ft. 4 in. in circumference, and a head 114 ft. in diameter. The drawings from which our engravings of these trees are taken were made for us in October, 1836, by the permission and at the expense of the Countess of Bridgewater. The celebrated beech at Woburn Abbey, commonly known as Pontey's Beech, which was measured for us by the direction of the Duke of Bedford, in February, 1837, is 100 ft. high, with a clear trunk of 50 ft.: the circumference of the trunk, at 4 ft. from the ground, is 12 ft. 6 in.; and the cubic feet of timber which it contains are, by measurement, 317 ft.; and that in the head, by computation, is estimated at 50 ft.; giving a total of 367 ft. of useful timber. This tree was measured in 1829; since which period it has increased in circumference, at 4 ft. from the ground, 6 in.; and in cubic feet of timber in the trunk, 5 ft. A silver fir, in the park at Woburn, 114 ft. high, and containing 350 cubic feet of timber, exclusive of the head, had increased in circumference, in the same period, 12 ft. 6 in. at 4 ft. from the ground; and, in the cubic feet of timber in the trunk, no less than 11 ft.; thus showing the much greater rapidity of growth in the silver fir than in the beech. The highest beech in Raywood, at Castle Howard, was, in 1834, 110 ft. high, and it contained 940 cubic feet of timber; the circumference of the trunk, at 5 ft. from the ground, was 14 ft. 2 in., the length of clear bole was 70 ft., and the diameter of the head was 96 ft. A spreading beech at the same place was 80 ft. high, and contained 964 cubic feet of timber; the diameter of the head was 105 ft.; the circumference of the trunk, at 5 ft. from the ground, was 17 ft. 10 in., and the length of clear bole 40 ft. (See *Gard. Mag.*, vol. xi. p. 18.) At Bicton, in Devonshire, is a beech tree 104 ft. high, with a trunk 18 ft. in circumference; diameter of the head 87 ft. In Somersetshire, at Nettlecombe, is a beech 100 ft. high, with a trunk 24 ft. in circumference. In Wiltshire, in the grounds of A. B. Lambert, Esq., at Boyton, is a celebrated tree, called the Corton Beech, which measures 13 ft. 9½ in. in circumference, at 4 ft. from the ground; the trunk contains nearly 8 tons of timber, and the whole tree upwards of 11 tons. Mr. Lambert's father, about the beginning of the present century, betted this tree, every circumstance considered, against any tree of the same species in England, and won a pipe of wine by it. Mr. Lambert has three other beech trees of nearly equal dimensions, close adjoining this remarkable one. The subsoil is chalk. In Worcestershire, on an estate belonging to Lord Lyttelton, are the Frankly Beeches, which are of great antiquity. Standing on a hill, they can be seen to a great distance; and they are mentioned in old leases as land-marks. The largest was blown down some years ago; but those still standing have been measured for us through the kindness of Lord Lyttelton, and their dimensions are as follows:—The upper beeches are now reduced to four in number. The one blown down in 1833 was a noble tree, and considerably larger than any of the others; being about 20 ft. in circumference, with a proportionate height and head. The largest now standing is 14 ft. in circumference at 1 ft. from the ground, and is 70 ft. high. The lower beeches comprise five large, and six or eight smaller, trees; the largest measuring about 14 ft. in circumference. One of these was blown down in 1836, and was found much decayed. They are very handsome trees; and, from their mode of growth and commanding situation, they have a very striking effect. In Derbyshire, at Keddleston, the seat of Lord Scarsdale, is a beech tree which was removed about 70 years ago, when the present mansion was built, and which was then a large tree. It has now a trunk 12 ft. in circumference, and a head 52 ft. in diameter, touching the ground on every side. In Scotland the most remarkable beeches are, one at Newbattle Abbey, 88 ft. high, diameter of the trunk 9 ft. and of the head 100 ft.; one in Dumfriesshire, and two in Morayshire. The Eccles Beech (*fig.* 1912.) stands near Baitford, in Dumfriesshire. The trunk is 18 ft. in circumference, where it begins to throw out the branches, which extend over a space 95 ft. in diameter. An account and drawing of this tree has been sent to us by Mr. Grierson, secretary to



1909

the Horticultural Society of Dumfries, who adds, "The late proprietor of this tree, Mr. Maitland, used to bring his friends to sit beneath its shade to take their wine after dinner." The Earl's Mill Beech, in Morayshire (*fig.* 1913.), is 50 ft. high, with a trunk 17 ft. in circumference at 3 ft. from the ground, and a head 93 ft. in diameter. The Grange Hall Beech (*fig.* 1914.), in the same county, is only 36 ft. high, with a trunk about 14 ft. in circumference at 5 ft. from the ground, and a head 95 ft. in diameter. The roots rise up all round the trunk to the height of 2 ft. or 3 ft. from the ground, and form a natural seat, to which the immense and umbrella-like head affords an agreeable shade. The drawings of these last two trees were made for us by Mr. Stephens, artist, of Elgin, at the request, and expense of —— Macleod, Esq.



1910

Fàgus sylvática in England. In the environs of London, at Gunnersbury Park, are many fine beeches, 90 ft. high, with trunks about 9 ft. in circumference.—South of London. In Devonshire, at Killerton, a beech tree, 150 years old, is 68 ft. high, diameter of the trunk 7 ft., and of the head 97 ft. In Dorsetshire, at Melbury Park, 200 years old, it is 82 ft. high, diameter of the trunk 7 ft., and of the head 96 ft. In Somersetshire, at Cothelstone, it is 85 ft. high, diameter of the trunk 5 ft., and of the head 84 ft. In Surrey, at Claremont, it is 90 ft. high, diameter of the trunk 5 ft. In Sussex, at Kidbrooke, it is 70 ft. high, the diameter of the trunk 7 ft., and that of the head 87 ft. In Wiltshire, at Wardour Castle, 100 years old, it is 60 ft. high, the diameter of the trunk 5 ft. 6 in., and that of the head 82 ft.; and at Longford Castle, it is 70 ft. high, the diameter of the trunk 3 ft., and that of the head 50 ft.—North of London. In Berkshire, at Bear Wood, 16 years planted, it is 80 ft. high, the diameter of the trunk 2 ft., and that of the head 18 ft.; at High Clere, it is 67 ft. high, the diameter of the trunk 3 ft., and of the head 28 ft. In Denbighshire, at Llanbede Hall, it is 71 ft. high, the diameter of the trunk 3 ft., and of the head 47 ft. In Derbyshire, at Foston Hall, 100 years old, it is 78 ft. high, the circumference of the trunk 12 ft., and the diameter of the head 60 ft. In Essex, at Audley End, 80 years planted, it is 80 ft. high. In Gloucestershire, at Chipping-Cawdor, it is 85 ft. high, with a trunk 6 ft. 6 in. in diameter; at Doddington, it is 80 ft. high, the diameter of the trunk 3 ft., and that of the head about 70 ft. In Herefordshire, at Croft Castle, are several trees, from 80 ft. to 85 ft. high, with trunks about 20 ft. in circumference, and the branches extending over a space from 100 ft. to 120 ft. in diameter; at Eastnor Castle, 14 years planted, it is 40 ft. high, the diameter of the trunk 1 ft., and that of the head 32 ft. In Leicestershire, at Donnington Park, 100 years old, it is 96 ft. high, the diameter of the trunk 7 ft., and that of the head 100 ft. Mr. Donaldson, the steward at Donnington, who had this tree measured for us, states that when he sent the man up into the tree, there was a squirrel in it, which, not venturing to come down, as Mr. Donaldson was standing close by, mounted before the man to the very summit of the tree, from which immense height it leaped to the ground, and, falling on a tuft of beech leaves, ran away uninjured. In Nottinghamshire, at Worksop Manor, it is 90 ft. high, the diameter of the trunk 5 ft., and that of the head 117 ft. In Radnorshire, at Maeslaugh Castle, it is 70 ft. high, the diameter of the trunk 6 ft., and that of the head 90 ft. In Shropshire, at Willey Park, it is 25 ft. high, after being 9 years planted. In Staffordshire, at Trentham, it is 70 ft. high, the diameter of the trunk 5 ft., and that of the head 102 ft. In Suffolk, at Finborough Hall, 80 years planted, it is 90 ft. high, the diameter of the trunk 5 ft. 6 in., and that of the head 80 ft. In Warwickshire, at Combe Abbey, 60 years planted, it is 54 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 77 ft.; at Edgbaston, near Birmingham, it is 115 ft. high, with a trunk 4 ft. in diameter. In Worcestershire, at Croome, 65 years planted, it is 95 ft. high, the diameter of the trunk 4 ft. 6 in., and that of the head 60 ft. In Yorkshire, the immense trees at Studley, and at Raywood, have been already mentioned. (See p. 1977.)



1911



1912

Fàgus sylvática in Scotland. In the environs of Edinburgh, at Cramond House, it is 90 ft. high, the circumference of the trunk 13 ft., and the diameter of the head 111 ft.; at Dalmeny Park it is



1913

70 ft. high, the circumference of the trunk 10 ft., and the diameter of the head 60 ft.; at Barnton House it is 90 ft. high; at Gogar House it is 60 ft. high, diameter of the trunk 3 ft., and of the head 90 ft.; at Hatton House it is 90 ft. high, the circumference of the trunk 12 ft. 6 in., and the diameter of the head 60 ft.; at Hopetoun House, 100 years old, it is 80 ft. high, the diameter of the trunk 4 ft. 8 in., and of the head 60 ft.; at Moredun Park it is 85 ft. high, the diameter of the trunk 6 ft., and of the head 73 ft.—South of Edinburgh. In Ayrshire, at Dalquharran, it is 90 ft. high, the circumference of the trunk 16 ft., and the diameter of the head 96 ft.; at Kilkerran, 130 years old, it is 75 ft. high, the circumference of the trunk 24 ft., and the diameter of the head 96 ft. In Dumfriesshire, at Jardine Hall, are the remains of an avenue of beech trees, planted in 1708, some of the trees of which have trunks from 10 ft. to 15 ft. in circumference, and one, which is 73 ft. high, covers a space 73 ft. in diameter. In the stewartry of Kirkcudbright, at St. Mary's Isle, it is 63 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 51 ft. In Haddingtonshire, at Tyningham, it is 64 ft. high the diameter of the trunk 5 ft. 6 in., and that of the head 57 ft.—North of Edinburgh. In Banffshire, at Gordon Castle, it is 87 ft. high, the diameter of the trunk 4 ft. 6 in., and that of the head 60 ft. In Cromarty, at Coul, 162 years old, it is 80 ft. high, the diameter of the trunk 3 ft., and that of the head 63 ft. In Fifeshire, at Danibristle Park, it is 70 ft. high, the diameter of the head 82 ft. In Forfarshire, at Kinnaird Castle, 200 years old, it is 90 ft. high, the diameter of the trunk 6 ft., and of the head 105 ft.; at Courtachy Castle, 102 years old, it is 78 ft. high, the circumference of the trunk 18 ft., and the diameter of the head 60 ft. In Perthshire, at Taymouth, it is 96 ft. high, and has a trunk 17 ft. in circumference, and the diameter of the head 96 ft.; in Messrs. Dickson and Turnbull's nursery, Perth, 60 years planted, it is 66 ft. high, the diameter of the trunk 3 ft., and that of the head 42 ft. In Ross-shire, at Brahan Castle, it is 70 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 80 ft. In Stirlingshire, at Airthrey Castle, it is 136 years old, and 90 ft. high, the diameter of the trunk 5 ft., and of the head 92 ft.; at Callendar Park, 200 years old, it is 70 ft. high, the circumference of the trunk 17 ft., and the diameter of the head 86 ft.

1914



Fágus sylvática in Ireland. In the environs of Dublin, at Cypress Grove, it is 96 ft. high, the diameter of the trunk 3 ft. 10 in., and that of the head 66 ft.—South of Dublin. In the county of Cork, at Castle Freke, it is 53 ft. high, the circumference of the trunk 15 ft., and diameter of the head 30 ft. In Kilkenny, at Woodstock, 95 years planted, it is 91 ft. high, the diameter of the trunk 5 ft., and that of the head 48 ft.; at Borris it is 90 ft. high, the circumference of the trunk 18 ft., and the diameter of the head 96 ft. In King's County, at Charleville Forest, is a birch, which, though only 60 years planted, is 110 ft. high, with a trunk 17 ft. in circumference, and a head 90 ft. in diameter. In Limerick, at Mount Shannon, are many noble specimens.—North of Dublin. In Down, at Moira, it is 110 ft. high, the diameter of the trunk 4 ft. 6 in., and that of the head 80 ft. In Fermanagh, at Florence Court, 38 years old, it is 65 ft. high, the diameter of the trunk 2 ft., and that of the head 50 ft. In Sligo, at Mackree Castle, 73 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 54 ft.

Fágus sylvática in Foreign Countries. In France, near Nantes, it is 100 years old, and 90 ft. high. In the village of Laulnay, parish of St. Aubin-du-Perron, near the oratory of that name (Manche), which was possessed before 1791 by the Eudistes of Coutances, a birch tree was felled on the 27th of January, 1837; when a man who was splitting the wood, found in one of the branches a cross, 9 in. and 9 lines high, with cross bars of 1 in., and a pedestal of 1½ lines high, and 5 lines broad, which was perfectly regular (*L'Hermès*). A similar example is recorded in the *Magazine of Natural History*, vol. i. p. 471., as having been seen by us at Metz, in 1828. In Switzerland, the largest specimens of beech are two at the entrance to the Abbey of Pommiers, near Salène, each being 15 ft. in circumference at 2 ft. from the ground. In Austria, at Vienna, in the University Botanic Garden, 60 years old, it is 50 ft. high, diameter of the trunk 2 ft., and of the head 30 ft.; at Kopenzel, 60 years planted, it is 40 ft. high, the diameter of the trunk 1 ft. 6 in., and of the head 24 ft. In Prussia, in Berlin, at Sans Souci, 60 years old, it is 50 ft. high, the diameter of the trunk 3 ft., and of the head 28 ft.; in the Pfauen-Insel, 40 years planted, it is 36 ft. high. In Sweden, at Lund, in the Botanic Garden, 59 years old, it is 56 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 36 ft. In Italy, in Lombardy, at Monza, 24 years planted, it is 32 ft. high, the circumference of the trunk 3 ft., and the diameter of the head 39 ft.

Fágus sylvática purpùrea. The largest in England is that at Enville, in Staffordshire, which, as already mentioned, is about 70 ft. high, with a head 85 ft. in diameter; the longest branch measuring 42 ft. in extent from the tree. In the environs of London, is one at Syon, 71 ft. high, circumference of the trunk 8 ft. 6 in., and diameter of the head 61 ft.; at Kenwood is one, 36 years planted, which is 48 ft. high, circumference of the trunk nearly 6 ft., and diameter of the head 40 ft.; at Muswell Hill it is 62 ft. high, circumference of the trunk 14 ft., and diameter of the head 39 ft.; at Claremont, in Surrey, it is 50 ft. high, diameter of the head 40 ft. In Buckinghamshire, at Temple House, it is 30 ft. high, diameter of the head 20 ft.; in Cheshire, at Kinmel Park, it is 24 ft. high, diameter of the head 32 ft.; in Durham, at Southend, are several between 40 and 50 ft. high, after being only 18 years planted; in Gloucestershire, at Doddington, 30 years planted, it is 40 ft. high, diameter of the head 33 ft.; in Nottinghamshire, at Clumber Park, it is 42 ft. high, diameter of the head 52 ft.; in Oxfordshire, in the Oxford Botanic Garden, it is 55 ft. high, diameter of the head 40 ft.; in Pembrokeshire, at Stackpole Court, it is 35 ft. high, diameter of the head 27 ft.: in Suffolk, in the Bury Botanic Garden, it is 50 ft. high, diameter of the head 42 ft.; at Great Livermere, it is 35 ft. high, diameter of the head 40 ft.: in Worcestershire, at Croome, 38 years planted, it is 60 ft. high, diameter of the head 40 ft.; in Yorkshire, in the nursery of Messrs. Backkouse, at York, it is about 80 years old, 10 ft. 4 in. in circumference, 31 ft. high, and diameter of the head 44 ft. In Scotland, in Banffshire, at Gordon Castle, it is 56 ft. high, diameter of the head 54 ft.; in Fifeshire, at Raith House, it is 45 ft. high, diameter of the head 40 ft.: in Perthshire, at Inverary, 50 years old, it is 40 ft. high; and at Messrs. Dickson and Turnbull's Nursery, Perth, 40 years planted, it is 48 ft. high, diameter of the head 40 ft. In Ireland, at Cypress Grove, it is 40 ft. high, diameter of the head 40 ft.; in Kilkenny, at Borris, it is 56 ft. high, diameter of the head 59 ft.; in Waterford, at Salterbridge, it is 50 ft. high, diameter of the head 56 ft.; in Louth, at Oriel Temple, it is 54 ft. high. In France, at Scéaux, near Paris, 45 years planted, it is 70 ft. high; at Metz, it is 29 ft. high, diameter of the head 49 ft. In Germany, at Harbke, in Brunswick, it is 70 ft. high;

this tree produces about 20 lb. of mast every year, which sells at 2 dollars (9s.) per lb. (see *Gard. Mag.*, vol. viii. p. 445.): at Göttingen, in the Botanic Garden, 26 years planted, it is between 30 ft. and 40 ft. high. In Austria, at Vienna, at Laxenburg, it is 25 ft. high. In Prussia, at Berlin, at Sans Souci, it is 18 ft. high.

Commercial Statistics. In the London nurseries, mast is 10*s.* per bushel; two years' seedlings are 8*s.* per thousand; transplanted plants, from 2 ft. to 3 ft. high, 40*s.* per thousand. Plants of the purple-leaved variety are from 9*d.* to 1*s.* 6*d.* each; of the fern-leaved, from 1*s.* 6*d.* to 2*s.* 6*d.*; and of *F.* s. péndula, from 3*s.* 6*d.* to 5*s.* At Bollwyller, plants of the different varieties are from 2 to 3 francs each; and, at New York, the species is 25 cents per plant, and the varieties 1 dollar each.

⚘ 2. *F.* FERRUGI'NEA *Ait.* The *American* ferruginous-*wooded* Beech.

Identification. Ait. Hort. Kew., 3. p. 362.; Abbott Ins., 2. p. 149.; Willd. Arb., 112.; Michx. N. Amer., 3. p. 21.; Willd. Sp. Pl., 4. p. 460.

Synonymes. *F.* americàna latifòlia *Du Roi Harbk.*, 1. p. 269. *Wang.*, *Amer.*, p. 80.; red Beech, *Amer.*

Engravings. Michx. N. Amer. Syl., 3. t. 106.; Wang. Amer., t. 29. f. 55.; and our *fig.* 1917.

Spec. Char., &c. Leaves ovate, acuminate, thickly toothed; downy beneath; ciliate on the margin. (*Willd. Sp. Pl.*, iv. p. 460.) A North American timber tree, so much resembling the common European beech, as by some to be considered only a variety of it. It was introduced in 1766, and is not unfrequent in collections. The American beech is easily known from the European one by its much shorter obtusely pointed buds, with short, roundish, convex scales, which terminate almost abruptly, and are enclosed in numerous, short, loose scales.



1915

Varieties.

⚘ F. *f.* 2 *caroliniàna*; *F.* caroliniàna *Lodd. Cat.*, ed. 1836; and *fig.* 1915.; has leaves somewhat cordate at the base, ovate, slightly acuminate, obsoletely dentate, and somewhat mucronate. The colour is a very dark green, somewhat tinged with purple when fully mature. The veins of the under side of the leaf are somewhat hoary.

⚘ F. *f.* 3 *latifòlia*; *F.* latifòlia of Lee's Nursery; and our *fig.* 1916. — Leaves lanceolate, acuminate; tapering at the base, feather-nerved, much longer than those of the preceding variety in proportion to their length, and of a lighter green. It differs from the plant marked *F.* caroliniàna in the Hackney Arboretum; but, as the latter is very small, and the Hammersmith plant is growing in a better atmosphere, perhaps it is not worth keeping distinct.



1916

Description, &c. The red beech, Michaux observes, bears a greater resemblance to that of Europe than to the American white beech. It equals the latter in diameter, but not in height; and, as it ramifies near the ground, it has a more massive head, and a more tufted foliage. Its leaves are equally brilliant with those of the white beech, a little larger and thicker, and more deeply serrated. Its fruit is of the same form, but only half as large; while the prickles of its calyx are less numerous, but firmer. The wood

is somewhat red, or of a rusty hue, when mature; whence the name. A trunk of this species, 1 ft. 3 in. or 1 ft. 6 in. in diameter, commonly consists of 3 in. or 4 in. of sap, and 1 ft. 1 in. or 1 ft. 2 in. of heart wood; the inverse of which proportion is commonly found in the wood of the white beech. The distribution of this tree in the United States is almost exclusively confined to the north-eastern provinces, and Canada, Nova Scotia, and New Brunswick. In the district of Maine, and in the states of New Hampshire and Vermont, it is so abundant, as often to constitute extensive forests, the finest of which grow on fertile, level, or gently sloping lands, which are proper for the cultivation of corn. The wood of this species is considered stronger, tougher, and more compact than that of the American white beech; and, in the district of Maine and in British America, where the oak is rare, it is employed with the sugar maple and yellow birch, or *Bétula excélsa*, for the lower part of the frame of vessels. As it is extremely liable to injury from worms, and speedily decays when exposed to alternate dryness and moisture, it is seldom used in the construction of houses; but, where nothing better can be procured, it is selected for making hoops. Shoe-lasts are made of it, and other minor articles; because, when perfectly seasoned, it is not liable to warp. On the whole, the wood is inferior in compactness and solidity to the European beech, though planks of it, about 3 in. thick, are sometimes exported to Britain. The tree was introduced into England by Messrs. Lee and Kennedy; and its foliage makes a very fine appearance, both in the Hammersmith Nursery and at Messrs. Loddiges's. Though the leaves do not differ materially from those of the common beech during summer, yet, in autumn, they become decidedly darker, and die off of a rusty green, approaching, in *F.* f. caroliniàna, to black. In America, this species is subject to the attacks of Phalæ`na tessellàris (*Abb. and Smith Ins.*, ii. t. 75.; and our *fig.* 1918.), the cream-barred, or beech, tussock moth, which devours the leaves. The caterpillar of this insect is brown, and the imago pale buff: it is most common in Georgia. On the whole, both the species and its varieties well deserve culture as ornamental trees of the middle size. They

1917





1918

are propagated by layers and grafting; and plants, in the London nurseries, are 5*s*. each; at New York, 25 cents.

b. *Species not yet introduced.*

♀ 3. *F.* OBLI'QUA *Mirb.* The oblique-*leaved* Beech.

Identification. Mém. Mus., 14. p. 466.
Engravings. Mém. Mus., 14. t. 23.; and our *fig.* 1919.



1919

Spec. Char., &c. Leaves ovate-oblong oblique, somewhat rhomboid; blunt, doubly serrated, entire at the base; attenuated into the petiole, somewhat downy. Perianth of the male flowers solitary, hemispherical, sinuated. Anthers 30—40. Cupules capsuliform, muricate, 4-partite; segments ovate, obtuse. Ovaries included, 3-sided; angles winged. (*Mirbel.*) A tall tree, a native of Chili, and found by Dombey near Concepcion; flowering in September. In Chili, it is known by the name of Roblé. Leaves alternate, from 1 in. to 2 in. long, and from 4 lines to 8 lines broad. Stipules deciduous, membranaceous, lanceolate, linear; about the length of the petioles. (*Mirb. Mém. Mus.*, xiv. p. 466.)

B. *Cupule involucriform; Segments narrow, laciniate. Ovaries laterally inserted. Young leaves not plicate.*

a. *Species introduced into Britain.*

♀ 4. *F.* BETULÖI'DES *Mirb.* The Birch-like, *or evergreen*, Beech.

Identification. Mirb. in Mém. Mus., 14. p. 470.; Hook. in Bot. Mag.
Synonyme. Bétula antárctica *Forst.* in *Comm. Goett.*, 9. p. 45., *Willd. Sp. Pl.*, 4. p. 466.
Engravings. Mém. Mus., 14. t. 25.; and our *fig.* 1920.

Spec. Char., &c. Leaves ovate-elliptic, obtuse, crenulate, leathery, shining, glabrous; round at the base, on short footstalks. Perianth of the male flowers solitary, turbinate, 5—7-lobed. Anthers 10—16. Cupules involucriform, smooth, 4-partite; segments nearly linear, laciniate. Ovaries 3-sided, laterally exserted; angles marginate. (*Mirbel.*) An evergreen tree, a native of Terra del Fuego, where it forms vast forests. Branches divaricate, tortuous, brownish; young ones pubescent. Leaves ciliate, alternate, from 4 to 10 lines long, and from 3 to 8 lines broad. Flowers axillary. The structure and disposition of the male flowers, as well as many other characters of vegetation, resemble those of *F.* antárctica *Forst.*; but, according to this botanist, the leaves of *F.* antárctica are plaited in the bud; and the disk is less prolonged on one side of the petiole than on the other, which characters do not exist in *F.* betulöides. (*Mém. Mus.*, xiv. p. 470.) The evergreen beech grows at Port Famine, Straits of Magellan, and in its neighbourhood, in the greatest abundance. It attains a very large size; trees of 3 ft. in diameter being common, and there being many with trunks 4 ft. in diameter. There is one tree (perhaps the very same as that mentioned by Commodore Byron), the trunk of which averages 7 ft. in diameter to the height of 17 ft., and then divides into three large limbs, each of which is 3 ft. in diameter. (See *Journ. of Geo. Soc.*, and *Bot. Mag.* for June, 1836.) This beech is also a native of Van Dieman's Land, where it is called the myrtle tree by the colonists. It generally grows in the western part of the island, where an esculent fungus is found in clusters around the swollen parts of its branches. This fungus varies in size from that of a marble to that of a walnut: when young, it is whitish, and covered with a skin like that of a young potato. This skin is easily taken off; and the remaining portion, when raw, tastes like cold cow-heel. When this fungus is matured, the skin splits, and exhibits a sort of network of a yellowish white colour. (See *Backhouse* in *Gard. Mag.*, vol. xi. p. 340.; and *Comp. to Bot. Mag.*, vol. ii. p. 340.) *F.* betulöides is said to have been introduced in 1830; but we have not seen the plant.



1920

♀ 5. *F.* ANTA'RCTICA *Forst.* The antarctic Beech.

Identification. Forst. in Comment. Goett., 9. p. 24.; Willd. Sp. Pl., 4. p. 460.

Spec. Char., &c. Leaves ovate, blunt, glabrous; attenuated at the base; doubly dentate; their margins naked. (*Willd.*) A native of Terra del Fuego, and introduced in 1830. Branches rugged, tortuous. Leaves alternate, petiolate, 1¼ in. long; plicate; veins on the under side somewhat downy; the teeth roundish, blunt. (*Willd. Sp. Pl.*, iv. p. 460.) We have never seen the plant.

b. *Species not yet introduced into British Gardens.*

♀ 6. *F.* DOMBE'YI *Mirb.* Dombey's, *or the Myrtle-leaved*, Beech.

Identification. Mém. Mus., 14. p. 468.; Comp. Bot. Mag., 1. p. 301.
Engravings. Mém. Mus., 14. t. 24.; and our *fig.* 1921.



1921

Spec. Char., &c. Leaves ovate-lanceolate, somewhat rhomboid, pointed; serrated, coriaceous, shining, glabrous; wedge-shaped, and oblique at the base, on very short footstalks. Perianth of the male ternate, campanulate, 4—5-lobed. Anthers 8—10. Cupules involucriform, smooth, 4-partite; segments almost linear, laciniate. Ovaries laterally exserted, 3-sided; angles marginate. (*Mirb.*) A tall tree, a native of Chili, where it was found, along with *F.* obllqua, by the botanist after whom it has been named. It is known in Chili by the name of Coigué, and furnishes excellent wood for the purposes of construction. Young branches downy, glutinous. Leaves alternate, from 5 to 10 lines long, and from 3 to 5 lines broad, on the flowering branches, and about double the size on the sterile branches. Stipules oval, deciduous, about the length of the petiole. Fruit unknown. (*Mém. Mus.*, xiv. p. 468.)



1922

♀ 10. *F.* DU'BIA *Mirb.* The dubious Beech.

Identification. Mém. Mus., 14. t. 26.
Engravings. Mém. Mus., 14. t. 26.; and our *fig.* 1922.

Spec. Char., &c. Leaves ovate, bluntish, doubly serrate, coriaceous, shining, glabrous; round at the base, on short footstalks. Perianth of the male solitary, turbinate, 5—7-lobed. Anthers 10—16. (*Mirb.*) It is extremely probable that the *F.* dùbia is nothing more than a variety of *F.* betulöides. The branches are smoother and more elongated; the leaves larger, oval, and not elliptic; and dentate, not crenulate; all which differences may be the result of a more vigorous growth. The dried specimen in other respects perfectly resembles that of *F.* betulöides; and Commerson, who gathered it at the Straits of Magellan, had placed it along with that species, under the name of *Bétula* antárctica. As Mirbel had not seen the female flower, he thought it better not to confound it with *F.* betulöides.

GENUS III.



CASTA'NEA *Tourn.* THE CHESTNUT. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Tourn., 352.; Willd. Sp. Pl., 4. p. 460.; N. Du Ham., 3. p. 65.
Synonymes. Fàgus *Lin.* and others; Châtaignier, *Fr.*; Kastanie, *Ger.*; Castagno, *Ital.*; Castano, *Span.*; Castanheiro, *Port.*; Castanietræ, *Swed.* and *Dan.*; Keschton, *Russ.*
Derivation. From *Castanea*, a town in Thessaly, or from another town of that name in Pontus.

Description, &c. Deciduous trees, with nearly the same geographical distribution as the oak, but more tender. There is only one European species, which is chiefly valuable as a fruit tree, and as coppice-wood; the timber of full-grown trees being brittle, and of short duration. The foliage is large and ornamental; and, in this and its fruit, it bears a close analogy to the beech. The botanical difference between the two genera has been noticed in p. 1949.

♀ 1. *C.* VE'SCA *Gærtn.* The eatable, *sweet*, *or Spanish*, Chestnut.

Identification. Gærtn. Sem., 1. p. 181.; Michx. Amer., 2. p. 193.; Willd. Sp. Pl., 4. p. 460.; Lindl. Synop., p. 171.
Synonymes. Fàgus Castànea *Lin. Hort. Cliff.*, 447., *Hort. Ups.*, 287., *Roy. Lugdb.*, 79., *Mat. Med.*, 203., *Dalib. Paris.*, 294., *Gron. Virg.*, 150., *Du Roi Harbk.*, 1. p. 270., *Kniph. Cent.*, 5. No. 31., *Regn. Bot.*; Castànea sativa *Mill. Dict.*, No. 1., *Scop. Carn.*, No. 1187., *Hall. Helv.*, No. 1623., *Blackw.*, t. 330., *Houtt. Lin. Pfl.*, 2. p. 328.; *C.* vulgàris *Lam. Encyc.*, 1. p. 708., *N. Du Ham.*, 3. p. 66., *Eng. Bot.*, t. 886., *Eng. Fl.*, 4. p. 151., *Hook. Br. Fl.*, ed. 3., p. 411., *Mackay Fl. Hibern.*, p. 251.
Derivation. The term Sweet Chestnut is applied with reference to the fruit, in contradistinction to the fruit of the horsechestnut, which is bitter. It is called the Spanish chestnut, because the best chestnuts for the table, sold in the London markets, are imported from Spain.
Engravings. Eng. Bot., t. 886.; Blackw., t. 330.; Hunt. Evel., 1. p. 152.; N. Du Ham., 3. t. 19.; and the plates of this tree in our last Volume.

Spec. Char., &c. Leaves oblong-lanceolate, acuminate, mucronately serrated; glabrous on each side. (*Willd.*) A stately tree, rivalling the oak in size and longevity; but, in regard to its timber, comparatively worthless. A native of Asia Minor; but cultivated in the temperate parts of Europe from time immemorial.

Varieties. These may be arranged in two classes; those which are considered botanical varieties, and those which are cultivated on account of their fruit.

A. *Botanical Varieties.*

♀ C. *v.* 2 *asplenifòlia* Lodd. Cat., 1836; C. heterophýlla *Hort.*; *C.* laciniàta *Hort.*; *C.* salicifòlia *Hort.*, has the leaves cut into shreds, regularly, or irregularly, and sometimes so as to appear like linear-lanceolate leaves; and hence the epithet of salicifòlia.

♀ C. *v.* 3 *cochleàta* Lodd. Cat., 1836, has the leaves cuculate, or hooded, with a diseased stunted appearance.

♀ C. *v.* 4 *glàbra* Lodd. Cat., 1836; *C.* v. fòliis lùcidus *Hort.*; has the leaves rather thin, and more shining than those of the species.

♀ C. *v.* 5 *glaúca*, *C.* glaúca *Hort.*, has the leaves somewhat glaucous.

♀ C. *v.* 6 *variegàta*; *C.* v. fòliis aúreis *Lodd. Cat.*, 1836; has the leaves variegated with yellow, with some streaks of white; and the tree, when of a larger size, makes a splendid appearance in spring, and is admirably adapted for planting among evergreen shrubs, along with the balsam poplar; the colour of which, when the leaves first expand, has all the rich yellow of this variety, with the advantage of being associated in the mind with ideas of health; whereas variegation is known to be generally the effect of disease.

♀ C. *v.* 7 *americàna*; *C.* vésca *Michx. N. Amer. Syl.*, iii. p. 9.—This variety has broader leaves than the European chestnut.

B. *Fruit-bearing Varieties.*

In the French catalogues these are very numerous; and in *De Chabrol's Statistiques de Savone*, &c., it is stated that between 40 and 50 varieties are cultivated in the province of Mondovi, in Piedmont. (See *Gard. Mag.*, vol. i. p. 322.) There are upwards of 20 sorts cultivated in the London Horticultural Society's Garden, of which Mr. Thompson considers the four following as deserving the preference for ornamental cultivation: — Châtaignier prime, C. Rallue, the Downton Chestnut, and Prolific Chestnut.

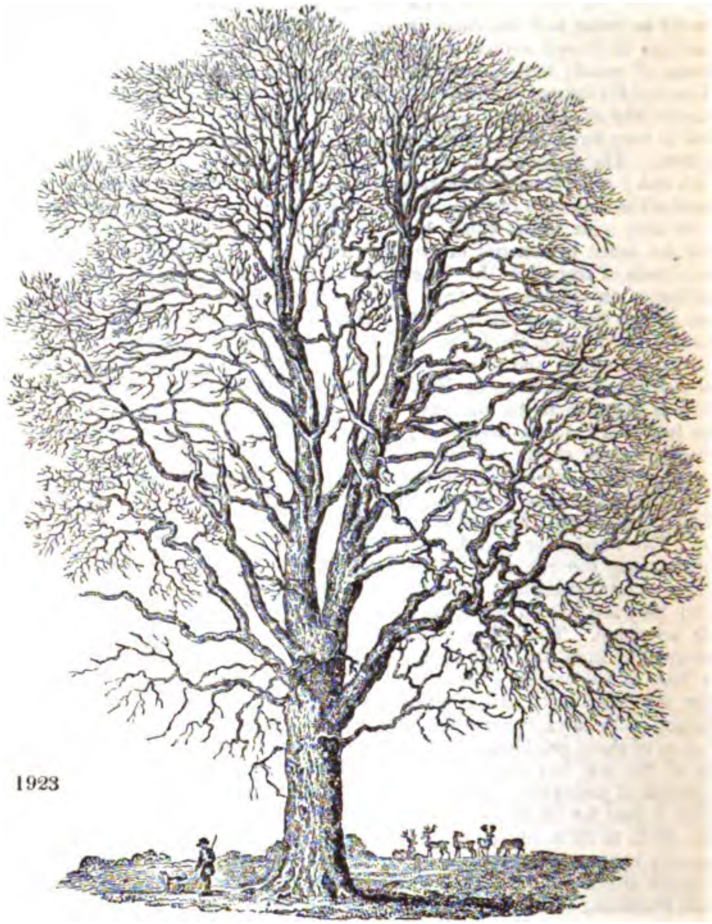
Besides these there are the following English sorts:—Devonshire, Lewis's, Lisbon, Masters's, Canterbury, Knight's Prolific, and the New Prolific. The nurserymen in the south of Devonshire, and in Jersey, generally pay more attention to the sweet chestnut, as a fruit tree, than the nurserymen in the neighbourhood of London. There is said to be a tree of a very superior variety in a garden in St. Peter's parish, Jersey, from which, it is believed, plants are propagated in Saunders's Nursery, in that island. (See *Gard. Mag.*, vol. vii. p. 101.)

The varieties cultivated in France for the table are divided into two kinds, viz., *les châtaignes* and *les marrons*; the former being to the latter what the crab is to the apple. The latter are, of course, much preferred, being larger, more farinaceous, and sweeter. When roasted, they have also a rich creamy flavour, and an aromatic odour, in which the common chestnuts are quite deficient. The best marrons sold in Paris are the marrons de Lyons; and the best kinds of the common chestnut are: — La châtaigne de Bois, the fruit of which is small, will not keep, and is of little flavour; and the tree forms the principal coppice-wood in the neighbourhood of Paris: la Châtaigne ordinaire, of which the fruit is rather better, and the tree more vigorous, and a greater bearer: la Châtaigne pourtalonne, the fruit of which is very fine, and produced in great abundance: la Châtaigne printanière, the fruit of which has no other merit than that of being produced very early in the season: la Châtaigne verte du Limousin, which produces very large excellent fruit, which will keep a long time, and the tree of which preserves its leaves green much longer than any of the other varieties: and la Châtaigne exalade, the fruit of which is the best of all the common chestnuts for the table; but the tree, which is low, with spreading branches, is such an abundant bearer, that it soon exhausts itself. (*Le Bon Jard.* 1837.)

Description, &c. The chestnut, under favourable circumstances, is a magnificent tree, though it never attains a height, or diameter of head, equal to

the British oak; and it differs essentially from that tree, in its timber not increasing in value as it increases in age. The trunk, in deep free soils, and in situations sheltered rather than exposed, rises erect, and forms a massive column of wood; but, in unsuitable soils, and in elevated exposed situations, and in cold climates, it ramifies at the height of 10 ft. or 12 ft., and the tree assumes the character of a large pollard. In all cases, the diameter of the trunk is very large, in proportion to the diameter of the head, or the height of the tree. The branches form nearly the same angle with the trunk as those of the oak; though in thriving trees the angle is somewhat more acute. They spread widely, and are round, and smooth when young. The bark is remarkable for its deep wide clefts, which, Sir J. E. Smith says, "seem to have furnished ideas for some ornaments in Gothic architecture;" alluding, we suppose, to some kinds of tracery in the upper parts of windows in the florid Gothic style. The leaves on old trees are from 4 in. to 6 in. long; but on young and vigorous shoots they are often nearly 1 ft. in length, and from 3 in. to 4 in. in breadth. In France, the leaves of the châtaigniers are narrower than those of the marroniers, and those of both are narrower than the leaves of wild and cultivated chestnuts in England; which difference may be observed in the two climates to be the case more or less with all broad-leaved trees. The leaves are elliptic-lanceolate, acute, smooth, with many transverse veins, terminating in sharp serratures; often, but not always, terminating in mucros. They are of a rich shining green above; and paler, and sometimes rather glaucous, beneath. The barren catkins are numerous, axillary, solitary, yellow, and pendulous; almost as long as the leaves, and deciduous. The flowers are produced on the wood of the current year, and are ranged along the common stalk, in lateral sessile tufts. The stamens are numerous and spreading. The fertile flowers are much fewer than the barren ones: they are placed on terminal stalks, which are lengthened out as the fruit advances. The styles are about 6, with long, smooth, upright stigmas. Gærtner detected about 12 scarlet rudiments of stamens among the wool at the base of the styles. Nuts large, broadly ovate, generally 2; flat on the inner side, and each attached by a broad scar to the bottom of the greatly enlarged outer calyx, the outside of which is copiously armed with complicated clusters of sharp prickles. (*Smith.*) The root descends perpendicularly, like that of the oak, but not, as it is alleged, to quite so great a depth. The rate of growth of young trees, in the neighbourhood of London, averages from 2 ft. to 3 ft. a year for the first 10 or 12 years. The tree will attain the height of from 60 ft. to 80 ft. in from 50 to 60 years; before which period its timber is generally in the highest degree of perfection; but the tree will live for several centuries afterwards, and produce abundance of fruit; its timber, in the mean while, beginning to decay at the heart, or become brittle, and fit only for fuel. In Germany, according to Willdenow, the height is from 20 ft. to 30 ft., and the duration of the tree from 50 to 100 years. In America, according to Michaux, the chestnut, in favourable situations, commonly attains the height of 70 ft. or 80 ft., with a circumference of 15 ft. or 16 ft. The oldest chestnut in England is that at Tortworth, supposed to have been planted before the Conquest; and the largest which we have ever heard of is a tree in Studley Park, of which *fig.* 1923. is a portrait, to the scale of 1 in. to 30 ft.; and which is 112 ft. high; the diameter of the trunk, at 1 ft. from the ground, 7 ft. 4½ in., and of the head 91 ft. 6 in. By far the handsomest tree of this species in the neighbourhood of London, is that at Muswell Hill, figured in our last Volume, which is 66 ft. high, with a trunk 6 ft. in diameter at a foot from the ground, and the diameter of the head nearly 70 ft. This tree has been planted between 70 and 80 years. No tree stoles more freely than the sweet chestnut, at whatever age it may be cut over.

Geography. The sweet chestnut is found in the east and west of Asia, in the north of Africa, and in North America. In the Old World its countries are more particularly Asia Minor, Armenia, and Caucasus; but it is also found in the Canaries, and in Teneriffe. It does not grow spontaneously to the north of Tereck, in the Russian empire; and it does not ripen



1923

its fruit any where except in a climate that will ripen the grape also in the open air. There are several species found in Java, Japan, Cochin-China, China, and the Himalayas; and one of these is supposed to be identical with *C.* vésca. (*Mirbel.*) In Britain, the sweet chestnut is by some considered to be indigenous; but, notwithstanding the great age of some specimens, it appears to us more than probable that they have all been planted. This doubt is noticed by Ray and Evelyn, and was warmly taken up by Daines Barrington, about the middle of the last century; and the discussions which took place between that gentleman, M. Ducarel, and some others, will be found in the *Philosophical Transactions*, vols. lix. and lxi.; and in the *Gentleman's Magazine* for 1766. (See p. 23.) In the *English Flora*, the chestnut is stated to be "found in woods; and it appears to be wild in the south and west of England." It has been planted in Scotland, and sometimes ripens a few fruit in the warmest districts of East Lothian. It grows vigorously in Ireland, but never ripens fruit there. In Scandinavia it is unknown. It is apparently wild in some parts of France, and still more so in Spain and Italy; though it is most probable that it was originally planted in these countries by the Romans. It abounds in the neighbourhood of Nice, and in the kingdom of Naples. It is particularly

abundant on the Apennines, especially at Valombrosa, and also between Florence and Bologna, and we cannot help noticing a circumstance mentioned by Sir T. D. Lauder, as having struck him when in Italy, and with which we were ourselves very much pleased when there; viz. that these chestnut trees on the Apennines are generally scattered over a surface resembling the greensward of a British lawn. According to Dr. R. A. Philippi, Castànea vésca does not appear to be wild in any part of Etna, but always to be cultivated. "We noticed it," he says, "on the sides of Mount Zoccolaro, at a height of 3900 ft.; and Gemmellaro is said to have traced it as high as 5100 ft.; but this is probably a mistake, arising from an erroneous calculation of the altitude. On the south side of the Alps, the chestnut trees reach to 2500 ft., and on the Pyrenees to 2800 ft. Etna is celebrated for the great age and colossal dimensions of its chestnut trees: the noted Castagno di Cento Cavalli has a circumference near the root of 180 ft.; the Castagno di Santa Agata, 70 ft.; and the Castagno della Nave, 64 ft. Their stems, however, attain no great height, but soon branch off above the ground; and, in regard to the first-mentioned one, it seems probable to me that not one stem, but many, shoot from the same root; for there are now 5 individual trunks separate from each other; and it is a general custom in Sicily, when these trees attain a diameter of about 1 ft., to cut them down just above the root, when a number of new shoots are thrown out, which shortly become trees again. M. Brunner is of the same opinion, as is stated in his *Excursion through the East of Liguria, Elba, Sicily, and Malta.*" (See *Comp. to Bot. Mag.*, vol. i. p. 90.) In North America, the sweet chestnut is found as far as lat. 44° N., in New Hampshire; where, however, it is less common than in Connecticut, New Jersey, and Pennsylvania. It is most abundant in the mountainous districts of the Carolinas and of Georgia, and abounds on the Cumberland Mountains, and in East Tennessee; preferring, in all these countries, the sides of mountains, or the fertile gravelly soils in their immediate vicinity.

History. The sweet chestnut is generally said to have been brought to Europe by the Greeks, from Sardis, in Asia Minor, about 504 B.C. It was first called, in Greek, *Sardianos Balanos*, the Sardis nut; afterwards *Dios Balanos Lopimon*, from its being considered to bear some resemblance to the walnut, except in the smoothness of its inner bark. The name of Castànea was given to it from Kastanea, the name of a city in Pontus, in Asia; and also of one in the Vale of Tempe, near the river Peneus; in both which places the chestnut grew in great abundance, being a native of the former locality, and having been first planted in Greece in the latter, whence it was sent, in the reign of Tiberius Cæsar, to Rome. It is evident that the Romans received the chestnut from the Greeks, as they called it both Castanea and Glans Sardiana. Theophrastus mentions that, in his time, Mount Olympus was nearly covered with chestnut trees; and Pliny enumerates eight kinds that were known to the Romans in his day. Pliny adds that chestnuts were ground into meal, and made into bread, by the poor. These were of an inferior kind, to which he gives the name of *populares;* and he adds that there was another sort, which were generally boiled, and which were called *coctivæ.* He likewise says, — "Under the common name of nuts, we comprehend, also, chestnuts, though they partake rather of the nature of acorns; except that they have a larger and more prickly covering. It is surprising that we set so little value upon a fruit which nature has taken so much pains to preserve from injury. Sometimes three nuts are found in one of these prickly covers. The first skin of the nut is flexible; but the second has a bad taste in the mouth, like the skin of the walnut: therefore care should be taken to remove it. Chestnuts are better roasted than cooked in any other manner." (*Nat. Hist.*) One of the largest and oldest chestnut trees in the world is that on Mount Etna, above mentioned, and which is called Castagno di Cento Cavalli, because, as it is said, Jean of Arragon, on her road from Spain to Naples, visited Mount Etna, attended by her principal nobility, and was caught in a heavy shower; when the queen, and a hundred cavaliers, took shelter under the branches of this tree, which completely covered them, and saved them

from the rain. (*Houel*, *Voyage en Sicile*, tom. ii. p. 79.) The author adds, however, that the Spanish queen's visit is somewhat apocryphal. The tree itself, when visited by M. Houel, was in a state of decay: it had lost the greater part of its branches, and its trunk was quite hollow. A house was erected in the interior, with some country people living in it, with an oven, in which, according to the custom of the country, they dried chestnuts, filberts, and other fruits, which they wished to preserve for winter use; using as fuel, when they could find no other, pieces cut with a hatchet from the interior of the tree. In Brydone's time, in 1770, this tree measured 204 ft. in circumference. He says that it had the appearance of five distinct trees; but that he was assured that the space was once filled with solid timber, and that there was no bark in the inside. This circumstance of an old trunk, hollow in the interior, becoming separated, so as to have the appearance of being the remains of several distinct trees, is frequently met with in the case of very old mulberry trees in Britain, and olive trees in Italy. Kircher, about a century before Brydone, affirms that an entire flock of sheep might be enclosed within the Etna chestnut as in a fold. The sweet chestnut was, in all probability, introduced into Britain in the time of the Romans, for the sake of its fruit; and, being a tree of great duration, and ripening its fruit, it could hardly fail to become a permanent inhabitant. The old chestnut tree at Tortworth

1924



(*fig.* 1924., to a scale of 1 in. to 12 ft.) may, indeed, possibly have been one of those planted by the Romans. The oldest chestnut tree in the neighbourhood of London is that at Cobham, in Kent, of which *fig.* 1925. is a portrait, to a scale of 1 in. to 12 ft. Cambden mentions that Cowdray Park, in Sussex, was famous in his time for its chestnut trees; and the town of Cheshunt, in Hertfordshire, is supposed to have derived its name from the number of chestnut trees that formerly grew there. Old Tusser, in 1562, enumerates chestnuts, in his list of fruit trees which may be transplanted in January; and Lord Bacon mentions the chestnut in his *Essay on Plantations*. The tree, however, if once plentiful, appears soon to have become comparative scarcely; for the author of a tract entitled *An old Thrift newly revived*, published in 1612, recommends planting the chestnut as a "kind of timber tree of which few grow in England;" and which, he adds, will not only produce "large and excellent good timber," but "good fruit, that poore people, in time of dearth, may, with a small quantitie of oats or barley, make bread of." He also says that a chestnut tree, "when you begin first to plant it, will grow more in one yeare, than an oake will doe in two." (p. 7.) Mr. Samuel Hartlib,



1925

who wrote some years afterwards, says, "In divers places of Kent, as in and about Gravesend, in the countrey, and elsewhere, very many prime timbers of their old barns and houses are of chestnut wood; and yet there is now scarce a chestnut tree within 20 miles of the place, and the people altogether ignorant of such trees. This sheweth that in former times those places did abound with such timber." (*Legacy*, &c., p. 18.) A proof how early the idea prevailed of the wood of Quércus sessiliflòra being that of the chestnut. In the year 1676, an ancestor of the family of Wyndham of Felbrigg, in Norfolk, was said to be a great planter of chestnuts; and some account of his trees will be found in a succeeding page. The tree, however, was comparatively neglected, till towards the latter end of the last century; when the Society of Arts, reviving the idea (which, as we have seen above, was current as long ago as the time of Henry VIII.), that the carpentry of many of our old buildings consisted of chestnut wood, offered rewards for planting the tree; and these were given to a number of individuals who made plantations of it. The tree is now chiefly planted as coppice-wood and for its fruit in England, and as an ornamental tree in Scotland and Ireland. In England, it is chiefly planted in hop countries, and on the margins of orchards, as a fruit tree. There are considerable plantations of it in Devonshire, from which large quantities of fruit are sent to the London market.

In France, as in Britain, it was formerly believed that the timber in the roofs of the oldest cathedrals, and in the Louvre and other buildings, was of chestnut; and it was thought, in consequence, that the tree had, in former times, been much more abundant in France than it now is in that country. Buffon, however, demonstrated that oak wood, after a great number of years, puts on the appearance of that of the chestnut; and, afterwards, Daubenton, as we have seen (p. 1787.), set the question at rest, by showing that what had been taken for chestnut was Q. sessiliflòra. At the same time, it is observed in the *Dictionnaire des Eaux et Forêts*, that chestnut trees must formerly have been much more common in France than at present; because orchards of them are often referred to under the name of châtaigneraies in ancient writings; and Acosta reports that the groves of chestnut trees in France were almost totally destroyed in 1709, by a very severe frost, which followed suddenly after heavy rains. In the *Dictionnaire Universel* (published at Lyons in 1791, art. Châtaignier), it is stated, from the records of the city of Orleans, that "the Forest of Orleans has been observed to change alternately the species of its timber; to have been for a space of time in oak, then in chestnut, and after-

wards in oak again. In the woods of oak many young chestnut trees are found intermixed, which, being overpowered, make but small progress. When the former are felled, the latter, enjoying a freer current of air, grow vigorously, choke the young shoots of the oak, and assume their situations: the same has been remarked in other forests." (See *Trans. Soc. Arts.*, xii. p. 113.) At present, the chestnut abounds in France, on the borders of the Rhine, in Dauphiné and the Vosges, Limousin, and a great many other places. It is common in the neighbourhood of Paris, especially as coppice-wood; but the fruit is small, and of little value. The chestnut is cultivated, in the south of Germany, chiefly as undergrowth, for fence-wood, hop-poles, and vine-props. In Spain, the chestnut tree is grown chiefly for its fruit; which is produced in such abundance, as to be not only a common food of the peasantry, but an article of exportation; the best chestnuts of the London markets being always from Spain; and hence, as before observed, the name of "Spanish chestnut." According to M'Culloch, "chestnuts from Spain and Italy are frequently kilndried, to prevent germination on their passage. During the three years ending in 1831, the entries of foreign chestnuts for home consumption averaged 20,948 bushels a year. The duty of 2*s*. per bushel produced, in 1832, a sum which proved that the consumption in that year must have amounted to 23,216 bushels."

Poetical Allusions. Virgil frequently mentions the chestnut in his *Eclogues*, for its fruit; and in his *Georgics*, as a tree. In the latter, he calls it the lofty chestnut: "Ut altæ castaneæ." In the first Eclogue he says, —

——"Sunt nobis mitia poma,
Castaneæ molles, et pressi copia lactis."

"Ripe apples and soft chestnuts we have there,
And curd abundant to supply our fare."

In the second Eclogue, the chestnut is again mentioned, in a passage which is thus rendered by Dryden: —

"Myself will search our planted grounds at home,
For downy peaches and the glossy plum;
And thrash the chestnuts in the neighbouring grove,
Such as my Amaryllis used to love."

And Martial says: —

"Et, quas docta Neapolis creävit,
Lento castaneæ vapori tostæ." Lib. v. epig. 79.

"For chestnuts, roasted by a gentle heat,
No city can the learned Naples beat."

The old English poets frequently allude to the chestnut. Herrick says:—

"Remember us in cups full crown'd,
And let our city health go round;
Quite through the young maids and the men,
To the ninth number, if not ten;
Until the fired chestnuts leap
For joy to see the fruits ye reap
From the plump chalice and the cup,
That tempts till it be tossed up."

Ben Jonson speaks of the "chestnut whilk hath larded many a swine;" Shakspeare, in *Macbeth*, of a "sailor's wife with chestnuts on her lap;" and Milton alludes to the custom of roasting chestnuts: —

"While hisses on my hearth the pulpy pear,
And black'ning chestnuts start and crackle there."

In Catalonia, Philips tells us, a custom prevails of people going from house to house on All Saints' Eve, believing that by every chestnut that they eat in a different house they will free a soul from purgatory. (*Pom. Brit.*, p. 96.)

Properties and Uses. In a wild state, the nut of the chestnut affords food to many animals, though its leaves and wood feed but few insects; nor does it support many parasitic or epiphytic plants. Subjected to man, notwithstanding its near alliance to the oak, it is, both in the Old and New World, more

useful as a fruit tree than for its timber. The wood of the chestnut, however, has the remarkable property of being more durable when it is young than when it is old; the sap or outer wood very soon changing into heart wood; and hence the great value of this tree for posts, fencing-poles, stakes, hoops, &c. The wood, when green, weighs 68 lb. 9 oz. per cubic foot; and when dry, 41 lb. 2 oz. According to some authors, however, it weighs, when dry, 48 lb. The wood is easily distinguished from that of the oak, by the transverse fibres being more confused, and much less evident to the naked eye, more especially in a section newly cut; so that, to ascertain whether a plank of timber is oak or chestnut, it is only necessary to saw off a thin slice at one of its extremities. Bosc agrees in this, and draws as a conclusion from it, that the annual layers of the wood not being freely united together by transverse fibres, must necessarily be liable to separate, and to become subject to the disease which is called, in France, *cadranure* (literally, dialling). This disease cannot be discovered till the tree is cut down; when it is found to be open at the heart, with rents radiating from its centre towards the circumference; in consequence of which the wood is unfit for being sawn into either planks or beams, and can only be employed for laths or fencing. Bosc found that of the trunks of 30 chestnut trees, about 1 ft. in diameter, which he had seen cut down and squared in the forest of Montmorency, there were 20 in the diseased state above described. Hence, he says, we seldom find any trunks of old chestnut trees, because this peculiarity in their organisation not only unfits them for every purpose of carpentry or joinery, but occasions them to decay from the centre outwards. To us it appears probable that this organisation, by lessening the communication of the juices of the tree in a horizontal direction, may also be the cause why the sap wood so soon becomes heart wood. Be that as it may, it is clear that all that has been said in favour of planting the chestnut for its timber can only rank, in point of authority, with what has been said respecting planting the locust for the same purpose. The French writers state that chestnut wood is a good deal used for making wine-casks; a circumstance noticed by Rapin, in his poem entitled *The Garden*:—

> "With close-grain'd chestnut, wood of sov'reign use,
> For casking up the grape's most powerful juice."

Wine is said to ferment in chestnut casks more slowly, and be less likely to evaporate: it also does not contract any unpleasant taste. There is scarcely any wood, according to Du Hamel, which makes better hoops, as these resist the dry rot in cellars where every other kind of wood decays. Du Hamel observes, at the same time, that chestnut wood decays speedily, when it is subjected alternately to dryness and moisture. (*Exploit de Bois*, p. 296.) Varennes de Fenille, on the other hand, states that, in La Bresse, posts of chestnut are preferred to those of every other wood for forming the supports of huts, notwithstanding these posts are subjected to the action of alternate humidity and dryness. The wood of the chestnut is not much approved of as fuel: it throws out sparks, and smoulders in the fire rather than flames; though it gives out a great deal of heat. The charcoal, though good, is not of the first quality: it is inferior to that of the oak for domestic purposes, and for iron founderies; but, according to Bosc, and most other Continental writers, it is superior to that of oak, or any other wood, for forges; and it is much used for that purpose in Biscay and in Spain. In Switzerland, chestnut wood is equally valued for forges; but, the tree being rare there, the charcoal is very dear. (*Hist. Nat. du Jorât*, i. p. 9.) The same thing, Michaux informs us, is the case in North America. The ashes of the wood of the chestnut furnish a great deal of potash. The bark, especially of young trees, is used for tanning; but it only sells for half the price of that of oak. The leaves, in country places in France, are used as litter for cattle; and, when dried, they are employed, like those of the beech, by the poor, for stuffing mattresses. "But those leafy beds," Evelyn observes, "for the crackling noise they make when one turns upon them, the French call *licts de parliament*." (*Hunt. Evel.*, i.

p. 163.) Such are the uses of the chestnut tree on the Continent; from which, we think, it will not be wondered that Emmerich (*Culture of Forests*, &c.), and German authors generally, should consider the chestnut as not ranking as a forest tree.

We shall now take a short view of the uses of the chestnut tree in England from the time of Evelyn. This author commences by saying, that "the chestnut is, next the oak, one of the most sought after by the carpenter and joiner. It hath formerly built a good part of our ancient houses in the city of London, as does yet appear. I had once a very large barn near the city, framed entirely of this timber; and, certainly, the trees grew not far off, probably in some woods near the town; for, in that description of London written by Fitz Stephens, in the reign of Henry II., he speaks of a very noble and large forest, which grew on the boreal part of it, and which was well stored with all sorts of good timber." (*Hunt. Evel.*, i. p. 161.) It is evident that Evelyn here falls into the common error, already noticed, of confounding the chestnut with the oak. He goes on to say that the chestnut affords the best stakes for palisades, props for vines and hops, and is good for mill timber and water-works, or where it may lie buried; "but if water touch the roots of the growing tree, it spoils both fruit and timber." It does well, he says, if kept dry, for columns, tables, chests, chairs, stools, and bedsteads; and, for tubs and wine-casks, "which it preserves with the least possible tincture of the wood of any whatsoever. If the timber be dipped in scalding oil, and well pitched, it becomes extremely durable; but, otherwise, I cannot celebrate the tree for its sincerity, it being found that, contrary to the oak, it will make a fair show outwardly, when it is all decayed and rotten within: but this is in some sort recompensed, if it be true that the beams made of chestnut tree have this property; that, being somewhat brittle, they give warning, and premonish the danger by a certain crackling; so as, it is said, to have frighted those out of the baths at Antandro, whose roof was laid with this material, but which, Pliny says, was of hazel, very unlike it. Formerly, they made consultary staves of this tree; and the variegated rods which Jacob peeled to lay in the troughs, to impress a fancy in his father-in-law's conceiving ewes, are said to have been of this material. The coals are excellent for the smith, being soon kindled, and as soon extinguished; but the ashes of chestnut wood are not convenient to make a lee with, because it is observed to stain the linen." (*Hunt. Evel. Syl.*, i. p. 162.) Cook, who may be considered as Evelyn's contemporary, recommends the chestnut for coppice-wood, and says the timber is very useful. Miller falls into the error of his time, in considering the old roofs of oak as being formed of chestnut; and hence he recommends the latter, as being a very valuable kind of timber; though, in the edition by Martyn, this author states that he thinks the timber supposed by Miller and other writers to be chestnut, in our old buildings, is only oak of a different grain, and of an inferior quality. Marshall says, "The uses of the chestnut have been highly extolled, and it may deserve a considerable share of the praise which has been given to it. As a substitute for the oak, it is preferable to the elm; but it is liable to to be shaky; and there is a deceitful brittleness in it." This property is also mentioned in White's *Selborne;* and with the addition, that "towards the heart the wood is cup-shaky; that is to say, apt to separate into small pieces like cups, so that the inward parts are of no use. They are bought for the purposes of cooperage, but must make but ordinary barrels, buckets, &c. Chestnut sells for half the price of oak; but has sometimes been sent into the king's dock, and passed off instead of oak." In another place, he observes that "the timber and bark" of old chestnut trees "are so very like oak, as might easily deceive an indifferent observer." Pontéy says that the wood and bark of the chestnut are known to possess the same valuable properties as those of the oak. Mitchell says that the wood of the chestnut is preferable to that of the oak, either in buildings or fences, and particularly for park poles. Mathew seems to confound the wood of the chestnut with that of the oak, observing that, in England, "many of the largest of our ancient piles are wooded of it." Its

decrease, he thinks, may be owing to a slight refrigeration of climate; but, as the climate is rather improved, and the spirit of planting become more general, this, he thinks, may give encouragement to more extended planting of the chestnut. There is one circumstance, he says, connected with the timber of the chestnut, in Scotland, which must prevent its general use in ship-building; and that is, that few trees of it of any size are found without the timber being shaky or split; some to such a degree, that the annual rings, or concentric growths, have separated from each other. Mr. Mathew, who is evidently an original observer, though, in this case, he has mixed up facts that have come under his own observation with the current opinion respecting the use of chestnut timber in old buildings, and in the Spanish navy, remarks, with Bosc, that the timber, though a good deal similar to that of the oak, is not "quite so reedy and elastic, but is destitute of the large laminæ, or plates (flosh), which, radiating from the pith to the outside, become so prominent to view in the oak, when the longitudinal section is parallel to the plane of the laminæ." (*Nav. Tim.*, p. 47.) We have quoted these different opinions, for the purpose of showing that the ground on which British authors hitherto have recommended the culture of the chestnut as timber is the erroneous supposition that the roofs of many of our ancient buildings are formed of it; and that, on the faith of this, Evelyn, and others of them, appear to have argued in its favour, contrary to their own experience.

The following remarks on the properties and uses of the chestnut by Mr. Nathaniel Kent, a well-known and highly respected land and timber surveyor, are dated 1792, and were published in the tenth volume of the *Transactions of the Society of Arts*. They seem to us to contain all that can be said, from practical experience, in favour of the chestnut as a timber tree in Britain. "In 1676," Mr. Kent observes, "an ancestor of the present Mr. Windham of Felbrigg, in Norfolk, had the merit of being a considerable planter of chestnut. In the space of 50 years, it is presumed, these plantations required thinning, as his successor, about that time, began to apply this timber to useful purposes upon his estate. The first account is of the branch or limb of a chestnut, about 13 in. square, which, in the year 1726, was put down as a hanging-post for a gate, and carried the gate, without alteration, 52 years; when, upon altering the enclosures of the farm where it stood, it was taken up under my direction, and appearing to be perfectly sound, was put down for a clapping-post in another place. In 1743, a large barn was built with some of this timber, and is now (1792) as sound in every part, beams, principals, and spars, as when first the barn was built. About the same time, several chestnut posts and rails were put down, which I have since seen removed; and, after standing 30 or 40 years, they generally appeared so sound, as to admit of being set up in some other place. The last instance I shall mention, though not of long date, will show the great superiority of this timber over oak in fences. In the year 1772, the present Mr. Windham made a large plantation in his park, which was fenced with posts and rails, converted from young oaks and chestnuts of the same age and scantling, such as were picked out of a place where they stood too thick. Last year, upon Mr. Windham's enlarging this plantation, it was necessary to remove this fence; when the chestnut posts were found as sound as when they were first put down; but the oak were so much wasted just below the surface of the ground, that they could not be used for the same purpose again without the assistance of a spur to support them." (*Trans. Soc. Arts*, x. p. 31.) "When the chestnut is suffered to stand beyond its full growth," Mr. Kent continues, "it is the worst of all timber, being more brittle and more apt to crack and fly into splinters, than any other: but I have never known this to be the case with young chestnut." Hence, he directs the tree to be cut when it is in a growing or healthy state; because it is "so early useful, that, if it be cut when it squares only 6 in., it will be as durable as an oak of six times its size and age. This is in a great measure accounted for by its having so little sap wood in proportion to other trees, as it will seldom exceed in thickness the breadth of the bark; whereas the sap wood of an

oak will often be from 1 in. to 2 in. thick; which is not only useless, but, if suffered to remain, tends very much to the destruction of the timber: in other respects, the duration of the chestnut may be accounted for from its being less affected by worms or insects than other timber." (*Ibid.*, p. 34.) He concludes: "Let no one be afraid of cutting it too young; for, let this tree be ever so small, if it is large enough for the purpose for which it is wanted, it will be the less liable to decay, from its youth; and, if underwood be the object, the proverb in beech countries will be fully verified: 'Cut wood, and have wood.'" (*Ibid.*, p. 35.) In some parts of Essex, the wood of the chestnut is preferred to that of the oak, for making gates, stiles, and hurdles; both of which last from 15 to 25 years. Chestnut piles are much used there for embankments against the Thames or the sea. They are made 5 ft. long, and 10 in. in diameter, and driven 3 ft. into the earth. In a cohesive oozy soil, their duration is almost without end; but, in sand, they do not last longer than the oak. The embankment is formed by heaping up earth on both sides of, and over the row of piles, and sometimes branches are interwoven with them. In the south and west of England, Mr. Davies informs us, the chestnut becomes shaky, even when the trunk is only 6 in in girt; but the stools, he says, by their numerous shoots and large broad leaves, afford excellent shelter for game. In every part of the country where hops are grown, the most durable poles are those of the chestnut; and in Kent, it is well known, this tree is more extensively planted for furnishing hop-poles than any other, unless we except the ash.

Chestnut timber, in North America, Michaux observes, "is strong, elastic, and capable of enduring the succession of dryness and moisture. Its durability renders it especially valuable for posts; which should be made of trees less than 10 in. in diameter, and charred before they are set in the earth. In Connecticut, Pennsylvania, and part of Virginia, it is also preferred for rails, and is said to last more than 50 years. For shingles, this wood is superior to any species of oak, though it has the same defect, of warping. It is not extensively used for staves; and its pores, like those of the red oak, are so open, that it is proper only for dry wares; though the European species," he adds, "which is more compact, is employed in Italy to contain wines and brandy." The chestnut of Europe is considered to make excellent hoops; but Michaux was informed by the coopers of New York and Philadelphia, that the American chestnut is too brittle for that purpose. A more probable reason, however, he observes, is, that, when bent, it is not strong enough to remain firmly attached, like the hoops of the hickory, by crossing the ends, but requires to be bound with osier, which is an additional labour and expense. The wood is little esteemed in America for fuel, as, being filled with air, it snaps as it burns; but it is much esteemed for the forge; and, in the neighbourhood of Pennsylvania, native chestnut woods have been turned into coppices, which are cut every 16 years for making charcoal.

Uses of the Fruit. Chestnuts are comparatively little used as food in England, as they are seldom eaten except roasted at dessert. They are, however, sometimes stewed with cream, and made into soup, either with milk or gravy. They are also occasionally used as stuffing for fowls and turkey; or stewed, and brought to table with salt fish.

Speaking of the chestnut as an article of food, Evelyn says, "We give that fruit to our swine in England, which is amongst the delicacies of princes in other countries; and, being of the larger nut, is a lusty and masculine food for rustics at all times, and of better nourishment for husbandmen than cale and rusty bacon; yea, or beans to boot. How we here use chestnuts in stewed meats, and beatille pies, our French cooks teach us; and this is, in truth, their very best use, and very commendable; for it is found that the eating them raw, or in bread, as they do in the Limousin, is apt to swell the belly, though without any other inconvenience that I can learn: and yet some condemn them as dangerous for such as are subject to the gravel in the kidneys; and, however cooked and prepared, flatulent, offensive to the head and stomach,

especially to those who are subject to the cholick. The best way to preserve them is to keep them in earthern vessels in a cold place. Some lay them in a smoak-loft, others in dry barley straw, others in sand, &c." (*Hunt. Evel.*, vol. i. p. 163.)

The principal countries where the chestnut is employed as an important article of food are, the south of France and the north of Italy; where it serves, in a great measure, as a substitute for both the bread and potatoes of more northern nations. In these countries, it becomes a matter of importance to preserve the chestnuts during winter; and, accordingly, great care is taken in gathering, keeping, and drying them, so as to insure a constant supply. When the chestnuts are ripe, those that are to be preserved are collected every day from the ground on which they have fallen from the tree; and spread out in a dry airy place, till the whole is gathered together. But, as it is often a considerable time before the chestnuts are all ripe enough to fall from the tree, if the season be so far advanced as to be in danger of snow or heavy rains, after the fallen chestnuts have been collected and set on one side for drying, the tree is beaten with long poles, to knock off the remaining fruit. This operation is called *gauler les châtaignes*. But the fruit thus collected is only considered fit for immediate use; and the greater part of it is carried to the local market, or sent to Paris. The husks of the chestnuts beaten off the trees being generally attached to the nuts, they are trodden off by peasants furnished with heavy sabots, when the nuts are wanted for immediate use; but, when the chestnuts are to be preserved a few months, they are generally kept in their husks in heaps in the open air, or in barrels of sand, which are sometimes actually sprinkled with water in very dry seasons, in order to preserve the full and plump appearance of the nuts.

One of the modes of drying chestnuts, in order to preserve them for several years, is, to place those which have been collected from the ground on coarse riddles, sieves, or hurdles, in a dry airy place, and afterwards to expose them to the sun; or to boil them for a quarter of an hour, and then dry them in an oven. In Limousin and Périgord, where the chestnut flour is used for making the kind of cake called *la galette*, and the thick porridge called *la polenta*, which are the common food of the peasantry, the chestnuts are dried with smoke. A thin layer of nuts, which have been deprived of their outer husks, is laid on a kind of kiln pierced with holes; and a fire is made below with the husks, and part of the wood of the tree, which is only permitted to smoulder, and is not suffered to burst into a flame. In a short time, the chestnuts begin to sweat; that is, their superabundant moisture oozes out through their skins. The fire is then immediately extinguished, and the chestnuts are suffered to become quite cold. They are then thrown on one side, and a fresh layer is spread out, and subjected to the same process. When a sufficient quantity of chestnuts is thus prepared, to cover the floor of the kiln at least 1 ft. deep, they are laid upon it, and a gentle fire is made below, which is gradually augmented during 2 or 3 days, and is then continued during 9 or 10 days, the chestnuts being regularly turned, like malt, till the nuts part readily from their skins: they are then put into sacks, which have been previously wet, and thrashed with sticks, or rubbed upon a large bench or table; after which, they are winnowed, and are then ready for the mill. During the process of drying, the fire is watched night and day; and the under side of the floor of the kiln (or hurdles, if these have been used as a substitute for a paved floor) must be frequently swept, to clear it from the soot. The dust which escapes from the chestnuts, when they are winnowed, together with the broken nuts, are carefully preserved for feeding cattle, and are called in France *biscat*.

The most general modes of cooking chestnuts in France are, boiling them in water, either simply, with a little salt, or with leaves of celery, sage, or any herbs that may be approved of, to give them a flavour; and roasting them, either in hot ashes, or in a coffee-roaster. They are also occasionally roasted before the fire, or on a shovel, as in England; but, when thus prepared, they are thought not so good. In whatever way the chestnuts are roasted, the

French cooks always slit the skin of all except one; and, when that cracks and flies off, they know that the rest are done. Chestnut flour is kept in casks, or in earthen bottles well corked; and it will remain good for years. *La galette* is a species of thick flat cake, which is made without yeast, and baked on a kind of girdle, or iron plate, or on a hot flat stone. It is generally mixed with milk and a little salt, and is sometimes made richer by the addition of eggs and butter; and sometimes, when baked, it is covered with a rich custard before serving. *La polenta* is made by boiling the chestnut flour in water or milk, and continually stirring it, till it has become quite thick, and will no longer stick to the fingers. When made with water, it is frequently eaten with milk, in the manner that oatmeal porridge is in Scotland. Besides these modes of dressing chestnuts, which are common in Italy as well as in France, many others might be mentioned; particularly a kind of *bouilli*, called *chatigna*, which is made by boiling the entire chestnuts, after they have been dried and freed from their skins, in water with a little salt, till they become soft, and then breaking and mixing them together like mashed potatoes; and a sweetmeat, called *marrons glacés*, which is made by dipping the marrons into clarified sugar, and then drying them, and which is common in the confectioners' shops in Paris. (See Parmentier's *Traité de la Châtaigne*; *Mém. de Desmarets* in *Journ. de Physique* for 1771 and 1772; *Du Ham. Arb.*, i. p. 136.; *N. Du Ham.* iii. p. 65.; *Dict. Class.*, &c., art. Châtaignier; *Nouv. Cours*, &c.) On the foreign modes of dressing chestnuts in Evelyn's time, that author says, "The best tables in France and Italy make them a service, eating them with salt, in wine, or juice of lemon and sugar, being first roasted in embers on the chaplet. In Italy, they boil them in wine, and then smoke them a little. These they call *anseri*, or geese: I know not why. Those of Piedmont add fennel, cinnamon, and nutmeg to their wine; but first they peel them. Others macerate them in rose-water. The bread of the flour is exceedingly nutritive: it is a robust food, and makes women well-complexioned, as I have read in a good author. They also make fritters of chestnut flour, which they wet with rose-water, and sprinkle with grated parmigans, and so fry them in fresh butter for a delicate." (*Hunt. Evel.*, i. p. 162.) Evelyn also says that "the flour of chestnuts made into an electuary with honey, and eaten fasting, is an approved remedy against spitting of blood and the cough; and a decoction of the rind of the tree tinctures hair of a golden colour, esteemed a beauty in some countries." (*Ibid.*, p. 163.) Sugar is said to have been obtained in France from chestnuts by the same process as is used for the extraction of the sugar from beet, and at the rate of 14 per cent; which is more than the average produce of the beet-root. (*Bon Sens*, as quoted in the *Athenæum* of Feb. 25. 1837.)

As a Tree for useful Plantations, the chestnut is chiefly valuable as underwood, and for its fruit. As underwood, as already mentioned, it is grown, in England, for hop-poles, fence-wood, and hoops. The poles last as long as those of the ash, and longer; but they do not grow so fast, and they are apt to send out stout side shoots, which, if not checked, either by pruning or by the closeness of the plantation, cause, Cobbett observes, "the upper part of the pole to diminish in size too rapidly. To get a chestnut pole any where between 12 ft. and 20 ft. in length, there will also be a disproportionate but; a disadvantage that none but skilful hop-planters can know. The vines of the hop (and it is the same with all other climbing plants) do not like to have a big thing to go round at starting." (*Woodlands.*) Hence intelligent hop-planters, "in order to obviate the injury arising from large-butted poles, stick in little rods as leaders, to conduct the vine to the pole at 2 ft. or 3 ft. from the ground. (*Ibid.*) For this reason, the plants, in a plantation of chestnuts for undergrowth, ought not to be farther apart than 5 ft. every way; in which case they will require very little pruning, but will become drawn up of a proper size. When the tree is planted for timber, its properties suggest the propriety of cutting it down when the trunk is under 1 ft. in diameter, and for using it chiefly in rustic structures, gate-posts, and fencing. As a fruit tree, we have

already observed that the chestnut, in Britain, is chiefly planted on the margins of orchards, for the purpose of sheltering them. It is also occasionally planted in hedgerows; but, from the density of the head, the early appearance of the foliage, and its long continuance before it drops, the tree is injurious both to the hedge and to the grass below.

As an ornamental Tree, Sang observes that many chestnuts should not be planted near a residence; because "the flowers emit a very powerful and disagreeable odour, which is offensive to most people." Gilpin considers the chestnut, in maturity and perfection, as a noble tree, which "grows not unlike the oak. Its ramification is more straggling; but it is easy, and its foliage loose. This is the tree which graces the landscape of Salvator Rosa. In the mountains of Calabria, where Salvator painted, the chestnut flourished. There he studied it in all its forms, breaking and disposing it in a thousand beautiful shapes, as the exigences of his composition required. I have heard, indeed," continues Gilpin, "that it is naturally brittle, and liable to be shattered by winds, which might be one reason of Salvator's attachment to it; but, although I have many times seen the chestnut, in England, old enough to be in a fruit-bearing state, yet I have seldom seen it in a state of full picturesque maturity." (*For. Scen.*) Bosc says: "As an ornamental tree, the chestnut ought to be placed before the oak. Its beautiful leaves, which are never attacked by insects, and which hang on the trees till very late in autumn, mass better than those of the oak, and give more shade. An old chestnut, standing alone, produces a superb effect. A group of young chestnuts forms an excellent background to other trees; but a chestnut coppice is insupportably monotonous." (*Nouv. Cours*, &c., art. Châtaignier.) In British parks, the chestnut is displayed to most advantage when standing singly, or in scattered groups along with the oak; and the gradation in the foliage and manner of tufting formed by Q. sessiliflòra, between the chestnut and Q. pedunculàta, forms a pleasing harmony, interesting both in a botanical and a picturesque point of view. In hilly grounds, the allusion which the chestnut creates to the Apennines affords a pleasing argument for planting it in such situations.

Soil and Situation. The chestnut, like the beech, prefers a deep sandy loam. It will not thrive in stiff tenacious soil; and, in a rich loam, its timber, and even its poles and hoops, are brittle, and good for nothing. In loamy soils at the bottom of mountains, as at Aloa, in Stirlingshire; in loam incumbent on clay, as at Brechin Castle, in Forfarshire; and in similar soils and situations; it attains a large size, and in so short a time, that, according to Sang, wherever the chestnut is planted in its proper soil and situation, it will outgrow any other tree in the same length of time, except, perhaps, the larch, the willow, and some of the poplars. According to Bosc, it will not thrive in calcareous soil; but clayey and sandy soils, and those lying over granite, gneiss, and schistus, and which are composed of the debris of these rocks, appear particularly suitable for it. It thrives well among rocks where there is apparently very little soil; insinuating itself among their fissures and chinks, and attaining a large size. "Wherever I have seen chestnut trees," observes the same author, "and I have seen them in a great many different localities, they were never in soils or on surfaces fit for the production of corn. On mountains in France, Switzerland, and Italy, the chestnut begins where the corn leaves off; and, in climates suitable for corn, the tree is only found on rocky and flinty soils." In Britain, the tree will not attain any height, unless in sheltered situations, and where the soil is free and of some depth; but in poor gravelly soil, where its roots will only run along the surface, it will attain a very considerable diameter of trunk, and be of great longevity, though its head may never be larger than that of a pollard. Of this, the chestnut trees in Greenwich Park and Kensington Gardens may be cited as proofs.

Propagation and Culture. The species is propagated by the nut, which may be treated exactly in the same manner as the acorn; and the varieties are perpetuated by grafting. The nuts, when they are to be sent to a distance, should, according to Parmentier, be gathered in bright sunshine, and exposed

to the full action of the sun's rays, on riddles, for seven or eight days. The effect of this will be to cause the fruit to shrink, and become somewhat furrowed; but it will retain its vital properties for planting, as well as its agreeable flavour as an article of food, for a much longer period than if it had not been dried. The nuts of the American chestnut are commonly sent over to the British seedsmen in dried moss; but those of Spain and France, sent over for the table, being generally smoked and kilndried, are seldom found to vegetate. Du Hamel directs the nuts intended to produce young plants to be germinated in sand, and the point of the radicle to be pinched off before planting; because by these means the nuts are kept out of the ground till late in the spring, and are in less danger of being eaten by vermin than if they were sown earlier. Boutcher proves the seeds by throwing them into a tub of water, preserving those which sink in dry sand till the beginning of March. He then sows them in drills 1 ft. 2 in. apart, and the nuts 6 in. asunder in the drill, covering them with soil to the depth of 3 in. Sang gives a covering of only 2 in. The nursery culture of Boutcher consists in taking up the plants at the end of the first season, and replanting them in lines at 2 ft. 6 in. asunder, and at 1 ft. distance in the line. Here they remain two years; after which, he again removes them (shortening the taproots which they will have formed) into lines 4 ft. asunder, and 2 ft. distant in the line, where they are to continue 3 years; after which they may be transplanted to where they are finally to remain. The grafting of the chestnut, according to Du Hamel, is most successful when performed in the flute manner. Knight (*Hort. Trans.*, vol. i. p. 62.) found the chestnut succeed readily when grafted in almost any of the usual ways; and, when the scions are taken from bearing branches, the young trees afford blossoms the succeeding year. It has been said that the tree is propagated by grafting in some of the Devonshire nurseries; but we have ascertained that this is not the case either in the Exeter Nursery, or in any of the nurseries in the Isle of Jersey, where, as already observed, the chestnut is much esteemed for its fruit. In pruning the chestnut as a fruit tree, it must be borne in mind that the blossoms appear on the young wood of the current year, which is produced at the extremity of the preceding year's shoots; and hence the necessity of keeping the head open, in order to give a greater surface for the annual production of young wood. In France, the chestnut is very apt to produce those large shoots of one season, called *gourmandes*, which are easily known on the chestnut, as on all other trees, by their vigour, and by their proceeding from the trunk or the principal branches, and never from the smaller branches. The usual remedy for this over-luxuriance in the tree is to shorten or remove these branches; but Mr. D. Beaton, in the *Gardener's Magazine*, vol. xiii. p. 203., has suggested a better mode; viz. allowing the *gourmandes* to exhaust themselves, and thus carry off the superflous vigour of the tree, only cutting out all the buds which they form; in consequence of which, the following year, the shoot becomes so weak as to admit of its being cut out without incurring the risk of forcing the tree to throw out other shoots of the same kind. Chestnut trees, whether grown for fruit or timber, at a certain stage of their growth, Bosc says, when they are from 200 to 300 years old, begin to decay at top; their branches dying back, and the leaves and fruit produced being much smaller than before. When this is the case, the whole of the branches forming the head are cut in to within 2 ft. or 3 ft. of the trunk, which invigorates the tree for a considerable period, and occasions it to produce remarkably large fruit. After this, when the trunk of the tree has become hollow, and there is danger of its being blown down by storms, it is pollarded, and in that state it forms a fine globular head, and continues to produce fruit and faggot-wood for many years.

Felling the Chestnut. As timber, the chestnut can hardly be allowed to stand with safety for more than 50 or 60 years; and, even at that age, on tolerably good and somewhat moist soil, it will be found shaky within, and fit only for fuel. A more profitable time, probably, for felling it would be when

the trunk averaged from 9 in. to 1 ft. in diameter, and then to use it as gate-posts, or posts for supporting shed roofs. As coppice-wood, the common period at which it is felled is about every 16 years; though in some places, as about Maidstone, in Kent, the poles are cut every 12 years, and even every 10 years. For hoops, they may be cut every 4 or 5 years.

Accidents, Diseases, &c. **The timber of the chestnut being brittle, and the branches spreading obliquely from the trunk, it is much more liable to be injured by storms than either the beech or the oak. The wood is also subject to become shaky, and cup-shaky in the interior (see p. 1992.); and to that peculiar disease, already mentioned (p. 1991.), which the French call dialling. The decay of the heart wood is also technically considered a disease named caries; and Chaptal informs us that, when he was travelling in different parts of France, and particularly in Cevennes, in the department of Allier, he observed a great number of chestnut trees with their trunks quite hollow, and charred over the whole of their interior surface. The inhabitants of the country explained to him that this operation was necessary to check the progress of the caries, or decay, which would otherwise speedily consume the entire tree. Hence, when they observe the disease beginning to spread, they cut the whole of the rotten wood out of the trunk, and then collect heath and other combustible plants, which, when thoroughly dry, they burn in the hollow of the tree, till the whole surface of the interior is completely charred. This is found effectually to stop the progress of the disease; and the operation is performed so dexterously, that it is very rare to find a tree destroyed by it. (*Bulletin des Sciences*, an 7, as quoted in *N. Du Ham.*, tom. iii. p. 79.) The leaves are liable to be attacked by few or no insects; and it is said that the wood never becomes worm-eaten. The nuts, however, in some seasons, are attacked by a kind of weevil, the Pyrale Pflugione of Fab. (see *Mém. de Réaum.*, tom. ii. pl. 11. No. 19.), which is in its imago state when the chestnut trees are in flower. To prevent it from depositing its eggs in the incipient fruit, the inhabitants of Cevennes, where it is most common, make fires to attract and burn the insect. When the germ of the fruit has been pierced, the nut never attains its full size, but drops off before it is half ripe. Sometimes these weevils are found in the perfectly ripe fruit; and care must be taken, in selecting chestnuts for seed, to observe whether they have been pierced on the side. We have twice had chestnuts sent to us for seed from the celebrated tree at Vermont, planted by the hands of Washington; but in both cases they had been pierced by some insect, and never vegetated.**

Statistics. Recorded Trees. The Tortworth Chestnut has been already mentioned. Lord Ducie, the proprietor of the estate on which it stands, had a portrait taken of it, from which an etching was made in 1772; and under it is the following inscription:—"The east view of the ancient chestnut tree at Tortworth, in the county of Gloucester, which measures 19 yards in circumference, and is mentioned by Sir Robert Atkins, in his *History* of that county, as a famous tree in King John's time; and by Mr. Evelyn, in his *Sylva*, to have been so remarkable for its magnitude in the reign of King Stephen (1135), as then to be called the Great Chestnut of Tortworth; from which it may reasonably be presumed to have been standing before the Conquest (1066)." (*Mart. Mill.*) At the time this etching was made, it appears that the tree was barely included within the garden wall, which bore hard upon it; but this wall has since been removed, and a top dressing of fresh soil applied to the roots, which seems to have invigorated the tree. The native soil in which it grows is a soft clay, somewhat loamy; and the situation is on the north-west side of a hill. Sir Robert Atkins is of opinion that it was originally several trees; and Marshall thinks that it is two trees grown together. In 1791, Mr. Lysons found it 44 ft. 4 in. round in the thickest part; which is considerably less than the dimensions given by Sir Robert Atkins, who makes it 19 yards (57 ft.); or by Bradley, who makes it 51 ft. at 6 ft. above the ground. An engraving of this tree by Strutt will be found in his *Sylva Britannica*, of which our fig. 1924. in p. 1988. is a copy, reduced to the scale of 1 in. to 12 ft. Its present measurement, at 5 ft. from the ground, Mr. Strutt observes, writing in 1820, is 52 ft.; which shows an increase of 2 ft. since 1766, when, at the same height, it measured only 50 ft. "The body is 10 ft. in height to the fork, where it divides into three limbs; one of which, at the period already mentioned, measured 28 ft. 6 in. in girt, at the distance of 50 ft. from the main trunk. The solid contents of the tree, according to the customary method of measuring timber, are 1965 ft.; but its true geometrical contents must be much more. Young trees have been raised from the nuts which it bore about 3 years ago." (*Sylv. Brit.*, p. 85.) Lord Ducie informs us, in a letter dated 1836, that the tree is still much in the same state as it was when drawn by Mr. Strutt; and the Rev. W. T. Bree, who saw it in the September of that year, characterises it as "a fine and most interesting relic. I wish," he continues, "that Strutt had given us a figure of the whole tree, instead of the lower part only; for, though the perfect head is but a modicum, or perhaps no part at all, of the original head, it yet makes a beautiful object altogether." In the park at Cobham, in Kent, is a chestnut, called the Four Sisters, figured by Strutt; the remains, as he states, "of a most magnificent tree. (See our fig. 1925. in p. 1989.) Its trunk is 35 ft. 2 in. in circumference at the ground, avoiding the spurs; 29 ft. at 3 ft. from the ground, 33 ft. at 12 ft. from the ground, and 40 ft. at the point where

the trunk divides. A number of tender shoots spring out annually from its topmost branches, and still give it, by the brightness of their foliage, an appearance of freshness altogether unexpected in such a ruin." Not far from this tree, in the same park, is the Fallen Chestnut, also figured by Strutt. Gilpin mentions some fine chestnuts on the banks of the river Tamar, in Cornwall, at an old house belonging to the Edgecumbe family; and also 70 or 80 trees at Beechworth Castle, in Surrey, with trunks measuring from 12 ft. to 18 ft., and even 20 ft., in girt. One of these trees was measured by Mitchell, and found to be 18 ft. in circumference, and 90 ft. high. At Winley, near Hitchin Priory, in Hertfordshire, a chestnut, in 1789, girted upwards of 14 yards (42 ft.) at 5 ft. from the ground: its trunk was hollow, and in part open; but its vegetation was vigorous. At Great Canford, in Dorsetshire, there were four large chestnut trees in the time of Grose; one of which measured 37 ft. round, and bore fruit plentifully, though the tree was much shivered and decayed by age. In *Martyn's Miller* it is stated, on the authority of Ord's MS., that the stem of an old chestnut near Fraiting, in Essex, yielded 30 loads of logs; and another is mentioned in Gloucestershire, which contained within its hollow trunk "a pretty wainscoted room, enlightened with windows, and furnished with seats." In Greenwich Park there are some large and old chestnut trees; one of which, in 1795, measured 17 ft. 6 in. in girt. At Shelford Lodge, Hampstead, in the same year, a chestnut measured 15 ft. in girt at 5 ft. from the ground.—In Scotland, a number of large chestnut trees are mentioned by Dr. Walker, Mr. Sang, and Sir T. D. Lauder. The latter observes, that the chestnut is found near all the old aristocratical residences in Scotland. He mentions a magnificent group of these trees at Winton, in East Lothian; and has given a figure of one at Riccarton, in the county of Edinburgh, the trunk of which measures 27 ft. in circumference, and the head covers a space 77 ft. in diameter. "A Spanish chestnut at Preston Hall measures, at 1 ft. from the ground, 18 ft. in girt; and at 10 ft., 19 ft." A chestnut at Kinfauns Castle, in Perthshire, which was cut down in 1760, had a trunk which measured 22 ft. 8 in. in circumference; and, though it was hollow, all the branches had leaves and fruit upon them the year it was cut down. It was supposed to be above 200 years old. The great chestnut that stood at Finhaven, in Forfarshire, was long accounted the largest tree of the kind in Scotland. We have given some account of it in our General History, p. 90. At Levenside, in Dumbartonshire, a chestnut of surprising bulk was thrown down by a hurricane, January 13th, 1739. Sang has given the dimensions of 17 large chestnuts, the smallest of which measured 8 ft. 6 in. in circumference at 4 ft. from the ground, with a trunk 36 ft. in length, and stands at Leslie House, in Fife; and the largest, which was blown down about the end of the last century, had a trunk which measured 17 ft. in circumference, and was 22 ft. in height. This chestnut, along with several other very large ones at the same place, is supposed to have been upwards of 300 years old.—In Ireland, there have been many fine chestnuts in different parts of the country. An avenue at Duganston, cut down in 1793, contained trees which measured from 14 ft. to 16 ft. 6 in. in circumference, with trunks, some of them 24 ft., and others 36 ft. in length. At Cranmore, near Belfast, is a very large chestnut tree, already mentioned, p. 112. At Bellione, trees planted 27 years had trunks 5 ft., and one 7 ft., in circumference at 1 ft. from the ground, and could have afforded planks 16 ft. long, and 12 in. broad. They grew in a strong loam on a limestone rock." (*Hayes's Treat.*, p. 162.)—In France, near Sancerre, M. Bosc saw a chestnut 32 ft. 6 in. in circumference at 6 ft. from the ground, which, 600 years before, was called the Great Chestnut of Sancerre. It was supposed to be 1000 years old, notwithstanding which its trunk looked perfectly healthy on its exterior; and it bore every year an immense quantity of fruit. Near Bode, where there are still some very large chestnut trees, there was one which fell in 1807, and which produced 18 cords of wood of 144 French cubic feet, 2500 poles 8 French feet long each, 90 stakes, and 300 faggots. At Plessis, near Bécherel, there is a chestnut, the trunk of which measured above 30 ft. in circumference at about 4 ft. from the ground; but its roots, which rise up out of the earth, would give it a much greater extent if it were measured at the surface. The English prisoners of war, who were confined at Bécherel, frequently visited this tree; and, from their report, few English travellers pass any where near it without turning out of their road to see the celebrated chestnut of Plessis. (*Bosc.*) Near Paris, at La Celle, Dr. Neill mentions, in his *Horticultural Tour*, an ancient plantation of *marroniers*, or cultivated chestnuts. Most of them, he says, are grafted trees; and, in some instances, the graft had greatly overgrown the stock. One aged tree measured, at the place of grafting, no less than 22 ft. 6 in. in circumference; while, immediately below the graft, the stock was only 15 ft. 6 in. in circumference. In the Forest of St. Germain en Laye, the deputation, of which Dr. Neill is the organ, found chestnuts (*châtaigniers*, not *marroniers*,) scattered up and down as single trees, and in small separate plantations. They were frequently of great age and large dimensions; the bole sometimes measuring 13 ft., 14 ft., and 15 ft. in circumference, and being sometimes quite hollow, though the head was vigorous. (p. 365.) In Tuscany, the chestnut trees of Valombrosa are celebrated for their size, the abundance of their leaves, and the deepness of the shade which they produce. (See p. 1987.) The expression, "Thick as the leaves of Valombrosa," has, indeed, almost passed into a proverb. (See *Lauder's Gilpin*, vol. i. p. 101.) In Sicily, the chestnuts of Mount Etna have been already mentioned. The dimensions of the 3 largest (Castagno di Cento Cavalli, Castagno di Santa Agata, and Castagno della Nave) have been already given (p. 1987.).

Existing Trees of Castànea vésca. The oldest trees in the immediate neighbourhood of London are in Greenwich Park and Kensington Gardens; but they are, for the most part, hollow trunks, with pollard-like heads. At Muswell Hill is the old chestnut figured in our last Volume, which is 66 ft. high; at Mount Grove, Hampstead, it is 57 ft. high, diameter of the trunk 3 ft. 6 in., and of the head 44 ft.; near Richmond, in the grounds of the Countess of Shaftesbury, it is 60 ft. high, diameter of the trunk 11 ft. 6 in., and of the head 60 ft.—South of London. In Devonshire, at Bicton, it is 28 ft. 6 in. high, diameter of the trunk 7 ft.; at Killerton, 34 years planted, it is 56 ft. high, diameter of the trunk 2 ft. 6 in., and of the head 57 ft.; at Endsleigh Cottage, 22 years planted, it is 50 ft. high, diameter of the trunk 1 ft. 5 in., and of the head 14 ft. In Dorsetshire, at Melbury Park, 100 years old, it is 66 ft. high, diameter of the trunk 9 ft., and of the head 60 ft.; at Compton House, 60 years planted, it is 60 ft. high, diameter of the trunk 3 ft. 4 in. In Hampshire, at Strathfieldsaye, it is 98 ft. high, with a trunk 4 ft. in diameter. In Kent, at Cobham Hall, 10 years planted, it is 30 ft. high, diameter of the trunk 9 in. (for the old trees at Cobham, see p. 1999.); at Waldershare is a fine old tree (*fig.* 1926.), 91 ft. high, with a trunk 24 ft. 10 in. in circumference at 1 ft. from the ground, and 15 ft. 10 in. at the height of 28 ft. The trunk is 51 ft. high before it divides into branches, and the diameter of the head is 65 ft. It grows in a sheltered situation, in loam on gravel. In Somersetshire, at Nettlecombe, 120 years old, it is 60 ft. high, diameter of the trunk 6 ft., and of the head 72 ft. 6 in. In Surrey, at Betchworth Castle, are some remarkably large chestnut trees. One measured for us in May, 1837, was 80 ft. high, the diameter of the trunk, at 1 ft. from the ground, 8 ft., and of the head 222 ft. The timber contained in this tree was estimated at 14 loads 25 ft. Another tree at the same place was 65 ft. high, the trunk 6 ft. 6 in. in diameter, and was estimated to contain 13 loads 8 ft. of timber. At Farnham Castle are some remarkably fine old chestnuts: one is 76 ft. high, diameter of the trunk 7 ft. 6 in., and of the head 60 ft.; and another 65 ft. high, diameter of the trunk 7 ft., and of the head 60 ft. In Sussex, at Cowdray, there is a magnificent avenue,



1926

upwards of a mile long, consisting of 300 chestnut trees, which average 48 ft. in height, with trunks about 6 ft. in diameter. In Wiltshire, at Wardour Castle, 40 years planted, it is 50 ft. high, diameter of the trunk 4 ft., and of the head 36 ft.—North of London. In Berkshire, at Bearwood, 16 years planted, it is 35 ft. high, diameter of the trunk 9 in., and of the head 18 ft. In Denbighshire, at Kinmel Park, it is 40 ft. high, diameter of the trunk 6 ft., and of the head 36 ft. In Gloucestershire, at Chipping Campden, it is 77 ft. high, diameter of the trunk 6 ft. 10 in.; at Norton House, it is 96 ft. high, with a trunk 8 ft. in circumference. In Herefordshire, at Croft Castle, are some very remarkable chestnuts; one of which is 80 ft. high, diameter of the trunk 8 ft. 6 in., and of the head 112 ft.! This is probably the largest chestnut in England. There is another chestnut at Croft Castle, which is 78 ft. high, diameter of the trunk 8 ft., and of the head 81 ft., and others of nearly equal dimensions. At Stoke Edith Park, in the same county, is a chestnut 60 ft. high, diameter of the trunk 5 ft. In Hertfordshire, at Cheshunt, the sweet chestnut, only 6 years planted, is 16 ft. high, diameter of the trunk 2 ft., and of the head 10 ft. In Leicestershire, at Belvoir Castle, 21 years planted, it is 40 ft. high, diameter of the trunk 1 ft., and of the head 13 ft.; at Doddington Park, 70 years planted, it is 77 ft. high, diameter of the trunk 7 ft. 6 in., and of the head 43 ft. In Nottinghamshire, at Thoresby Park, is a very remarkable tree, 100 years old, and 70 ft. high, with a trunk only 11 ft. in circumference at the ground, but with a clear upright bole, perfectly free from branches, to the height of 50 ft. In Oxfordshire, at Tew Park, 16 years planted, it is 44 ft. high. In Staffordshire, at Teddesley Park, 14 years planted, it is 30 ft. high, diameter of the trunk 9 in., and of the head 14 ft. In Suffolk, at Shrubland Park, it is 66 ft. high, diameter of the trunk 11 ft. 4 in., and of the head 66 ft. In Yorkshire, at Grimston, 11 years planted, it is 45 ft. high, the diameter of the trunk 7 in., and that of the head 18 ft.

Castànea vésca in Scotland. Near Edinburgh, at Gosford House, 30 years planted, it is 20 ft. high, the diameter of the trunk 4 ft. 4 in., with a widely spreading head; at Newbattle Abbey it is 60 ft. high, the diameter of the trunk 7 ft., and that of the head 70 ft.; at Barnton House, 90 ft. high, the diameter of the trunk 4 ft., and that of the head 48 ft.; at Hopetoun House, 100 years planted, it is 75 ft. high, the diameter of the trunk 4 ft. 4 in., and that of the head 50 ft.; at Moredun, it is 70 ft. high, the diameter of the trunk 5 ft., and of the head 58 ft.—South of Edinburgh. In Ayrshire, at Doonholm, 70 years planted, it is 55 ft. high, diameter of the trunk 3 ft., and of the head 32 ft.; at Blair, 100 years old, it is 70 ft. high, the diameter of the trunk 5 ft., and that of the head 22 ft.; at Auchincruive, 120 years old, it is 60 ft. high, the diameter of the trunk 5 ft. In the Stewartry of Kirkcudbright, at St. Mary's Isle, it is 48 ft. high, the diameter of the trunk 5 ft., and of the head 60 ft. In Haddingtonshire, at Tynningham, it is 49 ft. high, the diameter of the trunk 4 ft. 8 in., and that of the head 60 ft. In Renfrewshire, at Erskine House, it is 60 ft. h gh, the diameter of the trunk 3 ft. 2 in.; at Bothwell Castle, it is 68 ft. high, the diameter of the trunk 5 ft., and that of the head 60 ft.—North of Edinburgh. In Banffshire, at Gordon Castle, it is 64 ft. high, the diameter of the trunk 2 ft. 8 in., and that of the head 40 ft. In the Isle of Bute, it is 60 ft. high, the diameter of the trunk 4 ft., and that of the head 70 ft.; at Cullen House, 80 years old, it is 51 ft. high, the diameter of the trunk 3 ft. 4 in., and of the head 56 ft. In Cromarty, at Castle Send, 200 years old, it is 90 ft. high, the diameter of the trunk 8 ft. 6 in. and that of the head 180 ft.: by far the largest chestnut tree in Scotland. In Forfarshire, at Co,urtachy Castle, 102 years old, it is 45 ft. high, the diameter of trunk 3 ft., and of the head 48 ft. In Perthshire, at Kinfauns Castle, it is 68 ft. high, diameter of the trunk 5 ft. 6 in. and of the head 45 ft. This tree has a clear stem of 30 ft.; and is one of the chestnuts mentioned by Dr. Walker in an early statistical account of Scotland. At Taymouth, 80 years planted, it is 50 ft. high, diameter of the trunk 5 ft. 6 in., and of the head 50 ft.; at Lawers, it is 71 ft. high, and the diameter of the trunk 4 ft. 6 in. In Ross-shire, at Brahan Castle, it is 55 ft. high, the diameter of the trunk 2 ft. 6 in., and that of the head 50 ft.; at Castle Head, it is 18 ft. in circumference. In Stirlingshire, at Airthrey Castle, it is 70 ft. high, the diameter of the trunk 4 ft., and that of the head 39 ft.; at Bannockburn Wood, 120 years old, it is 76 ft. high, the diameter of the trunk 6 ft., and of the head 70 ft.; and at Sauchie, 90 years old, it is 93 ft. high, diameter of the trunk 4 ft., and of the head 60 ft.

Castànea vésca in Ireland. In the environs of Dublin, in the Glasnevin Botanic Garden, 35 years planted, it is 35 ft. high, the diameter of the trunk 1 ft. 6 in., and that of the head 30 ft.—South of Dublin. In the county of Cork, at Castle Freke, it is 44 ft. high. In King's County, at Charleville Forest, 45 years planted, it is 85 ft. high, the diameter of the trunk 2 ft. 8 in., and of the head 30 ft. In Kilkenny, at Borris, it is 53 ft. high, the diameter of the trunk 6 ft., and that of the head 70 ft.—North of Dublin. In Down, at Ballyleady, 60 years planted, it is 38 ft. high, diameter of the trunk 2 ft. 4 in., and of the head 51 ft. In Fermanagh, at Florence Court, 45 years planted, it is 50 ft. high, the diameter of the trunk 7 ft., and of the head 20 ft.; another, 160 years old, is 83 ft. high, diameter of the trunk 4 ft., with a clear bole 28 ft. high. In Sligo, at Mackree Castle, it is 50 ft. high, the diameter of the trunk 3 ft. 6 in., and that of the head 41 ft.; in Tyrone, at Baron's Court, 40 years planted, it is 35 ft. high, the circumference of the trunk 6 ft. 9 in., and the diameter of the head 30 ft.

Castànea vésca in Foreign Countries. In France, near Nantes, it is 100 years old, and 80 ft. high; at Colombe, near Metz, 60 years old, it is 39 ft. high, the diameter of the trunk 2 ft., and that of the head 50 ft.; in the Botanic Garden at Avranches, 22 years planted, it is 40 ft. high, the diameter of the trunk 1 ft. 3 in., and that of the head 29 ft. In Hanover, in the Göttingen Botanic Garden, 20 years planted, it is from 20 ft. to 25 ft. high. In Cassel, at Wilhelmshoe, 40 years planted, it is only 16 ft. high, with a trunk 1 ft. in diameter. In Austria, at Vienna, in the University Botanic Garden, 36 years old, it is 24 ft. high, the diameter of the trunk 1 ft., and of the head 20 ft. In Bavaria, at Munich, in the English Garden, 30 years old, it is 20 ft. high, the diameter of the trunk 4 in., and of the head 8 ft. In Prussia, in Berlin, at Sans Souci, 45 years old, it is 40 ft. high, the diameter of the trunk 9 in., and of the head 7 ft. In Sweden, at Lund, in the Botanic Garden, it is 30 ft. high, the diameter of the trunk 2 ft. 6 in., and that of the space covered by the branches 36 ft. In Italy, in Lombardy, at Monza, 50 years old, it is 84 ft. high, the circumference of the trunk 7 ft. 6 in., and the diameter of the head 45 ft.

♈ ☗ 2 *C.* PU'MILA *Willd.* The Dwarf Chestnut, *or Chincapin.*

Identification. Willd. Sp. Pl., 4. p. 461.; Michx. Amer., 2. p. 193.; Mill. Dict., No. 2.; N. Du Ham., iii. p. 79.

Synonymes. Fàgus pùmila *Lin. Sp. Pl.*, 1416., *Gron. Virg.*, 150., *Du Roy Harbk.*, 1. p. 275., *Wang. Amer.*, 57. t. 19. f. 44., *Abbott Insect.*, 2. p. 113. t. 57.; Castànea pùmila virginiàna, &c. *Pluk. Alm.*, 90., *Cat. Car.*, 1. p. 9. t. 9., *Du Ham. Arb.*, 3.; Châtaigner Chincapin, *Fr.*; swerch Kastanie, or Castanje, *Ger.*

Engravings. Wang. Amer., 57. t. 19. f. 44.; Abb. Ins., 2. t. 57.; Cat. Car., 1. t. 9.; Pluk. Alm., 90. t. 156. f. 2.; Michx. N. Amer. Syl., 3. t. 105.; our *fig.* 1927. from Michaux; and *fig.* 1928. from the tree in the Horticultural Society's Garden.

Spec. Char., &c. Leaves oblong, acute, mucronately serrated; covered with white tomentum beneath. (*Willd.*) A shrub, 7 ft. or 8 ft. high, but sometimes attaining the size of a tree 30 ft. or 40 ft. high. It is a native of North America, where it forms a shrub rarely exceeding the height of 7 ft. or 8 ft. in New Jersey, Delaware, and Maryland; though in South Carolina, Georgia, and Lower Louisiana, it is sometimes 30 ft. or 40 ft. high, with a trunk from 12 in. to 15 in. in diameter. The leaves are 3 in. or 4 in. long, sharply toothed, and similar in form to those of the *C.* v. americàna; from which they are distinguished by their inferior size, and the whiteness of their under surface. The fructification also resembles that of *C.* v. americàna in form and arrangement; but the flowers and fruit are only about half as large, and the nut is convex on both sides. (*Michaux.*) The chincapin is bounded to the northward, in America, Michaux adds, by the eastern shore of the river Delaware, on which it is found to the distance of 100 miles from Cape May. It is more common in Maryland, and still more so in the lower part of Virginia, in the Carolinas, Georgia, the Floridas, and Louisiana, as far as the river Arkansas. In West Tennessee, it is frequent in the prairies enclosed in the forests; and it abounds throughout the southern states, wherever the common American chestnut is wanting. The wood, Michaux informs us, is more compact, heavier, and finer-grained, than that of the American chestnut; and, as posts, it will last in the earth more than 40 years. The saplings, however, become loaded "with branches while they are no thicker than the finger, and are thus rendered too knotty for hoops." The fruit, which is about the size of the wild hazel, is brought to market in America, and is eaten raw by children. The tree requires a cool and fertile soil, with a mild climate; as, even in the south of the United States, it becomes stunted when it grows in arid land, and does not exceed the height of 6 ft. or 7 ft.; it is, however, one of the most common shrubs in the southern states of North America, as it



1927



1928

springs up spontaneously wherever the ground is not covered with water. It was one of the earliest-imported American plants, having been introduced by the Duchess of Beaufort in 1699. In British nurseries, this species is propagated by inarching on the common chestnut, or by layers. There are handsome small bushes of it in the Horticultural Society's Garden, and at Messrs. Loddiges's; and it is occasionally met with in collections. Seeds are also sometimes imported.

App. i. *Species of* Castánea *not yet introduced into European Gardens.*

Several species of chestnuts have been discovered in Nepal and Java; some of which were, at first, supposed to belong to the genus *Quércus*, but which have been separated from that genus, and referred to *Castànea*, by Dr. Lindley; and others, which have been described and figured by Blume, in his splendid work on the plants of Java. Dr. Lindley has given a synoptical list of the Indian *Castànea* in Dr. Wallich's *Pl. As. Rar.*, in which he enumerates eight different species, all of which we shall shortly notice below.



1929

C. *índica* Rox. Hort. Beng., p. 68., Lindl. in Wall. Pl. As. Rar., Royle Illust., p. 341., is a native of the mountains of Nepal and Silhet.

C. *Roxbúrghii Lind.*, l. c.; *Quércus castanicárpa Rox. Hort. Beng.*, p. 68., *Spreng. Syst. Veg.*, 3. p. 856.; is a native of Chittagong.

C. *sphærocárpa* Lindl., l. c.; *Quércus armàta Rox. MSS.*; is a native of the mountains near Silhet.

C. *tribuloìdes* Lindl., l. c., Royle Illust., p. 341; *Quércus tribuloìdes Smith* in *Rees's Cycl.*, No. 13., *D. Don.* in *Prod. Nep.*, p. 56., *Wall.* in *Litt.*; *Q. Catúngea* Ham. MSS.; *Q. fèrox Rox. Hort. Beng.*, p. 68. This species, according to Sir J. E. Smith, was discovered by Dr. Buchanan (Hamilton) in the forests of Upper Nepal, flowering and fruiting at various seasons. Dr. Buchanan supposed it to be an oak; and he describes it as being a tree with smooth branches, and leaves on short footstalks, lanceolate, more or less ovate, entire, taper-pointed, somewhat unequal at the base, about 4 in. long, 1½ in. broad; rigid, and rather coriaceous, with irregular, distant, slightly curved veins; the upper surface polished, and the under one paler, and opaque. The flowers are generally monœcious (though Dr. Buchanan observed one tree with only female flowers), in slender, downy, clustered, axillary, or terminal spikes; the male spikes being most numerous. Stamens about 8, with a dotted central disk. The calyx of the fruit is armed with very numerous, rigid, prominent, sharp thorns, a fourth of an inch or more in length, spreading in every direction. This species is called Cattum, or Cattumje, in the Parhatty language; Shingali, or Catu-Shingali, by the Nemours. (See *Rees's Cycl.*, art. Quercus.) Sir J. E. Smith adds that Dr. Buchanan found the flowers "agree with *Quércus*; to which genus he referred this remarkable plant;" though the "strongly muricated calyx," which, in some of his specimens, seemed to "split into 2 or 3 valves," approached "the nature of the chestnut." It is now generally allowed to belong to the genus *Castànea*.



1930

C. *martabánica* Wall. Pl. As. Rar., t. 107., and our *fig.* 1929., has the leaves lanceolate-oblong, acuminate, quite entire, smooth, on short footstalks, acute at the base, silvery beneath. Catkins downy, densely clothed with palmate branchy spines, divaricate. (*Wall.*) A native of Martaban, near Amherst. Dr. Wallich "only observed this fine large species of chestnut in the immediate neighbourhood of Amherst. It was covered with a profusion of fruit in the month of February. The seeds had an astringent taste. Professor Lindley thinks that there is no difference between *C. argéntea* of Dr. Blume's superb *Flora Javæ* and my (Dr. Wallich's) tree, except that the former is depicted with weak spines; a circumstance, no doubt, due to the fruit, which was described as having been unripe. I venture to dissent from my highly respected friend. Dr. Blume's tree appears to me to differ in the following points:— Its leaves are more acuminate at the apex, and sharper at the base; and their petioles longer. The fruit is smaller, and its spines much shorter and less compound. Besides, the locality seems to indicate a diversity: the Java tree grows on mountains, whereas mine occupies low ground, on the sea shore of Martaban." (*Wall. Pl. As. Rar.*, t. 107.):

Castánea argéntea Blume Fl. Jav., t. 21., and our *fig.* 1931., has the leaves oblong-lanceolate, much acuminated, narrowed towards the base, glabrous and silvery beneath. Catkins silky. A tall tree,



1931



1932

with a thick trunk; a native of mountains in the west of Java. The wood is used for beams and the axletrees of waggons; and the acorns are eaten when boiled or roasted. (*Blume.*)

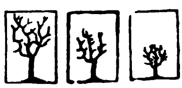
C. Tungúrrut *Blume Bjdr., Fl. Jav.*, t. 22., and our *fig.* 1930., has the leaves elliptic-oblong, acute, and ash-coloured beneath. The veins and catkins are downy. It is an immense tree, 150 ft. high; and is found in the province of Bantam, at an elevation of from 4000 ft. to 6000 ft. above the level of the sea. The natives call it Tungurrut, or Tungerreh. (*Blume Fl. Jav.*)

C. *javánica* Blume Fl. Jav., t. 23, 24, and our *fig.* 1932, has the leaves falcate, oblong-lanceolate, sharp at both ends, glabrous, ochreous beneath; the younger ones streaked underneath with dark yellow. A lofty tree, attaining the height of 120 ft., with a trunk 7 ft. in girt. Common in the woods of the volcanic mountain of Gedé. Blume mentions two varieties: C. j. montàna, C. montàna *Blume Bjdr.*, 10. p. 526.; and C. j. fucéscens. (*Blume.*)

C. *inérmis* Lindl. in Wall. Pl. As. Rar. is a native of Singapore.

C. *chinénsis* Spreng. is mentioned in our *Hortus Britannicus*.

Genus IV.



CA'RPINUS L. The Hornbeam. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Lin. Gen., 497.; Juss., 409.; Fl. Br., 1029.; Tourn., t. 348.; Lam., t. 780.; Gærtn., t. 89.; Willd. Sp. Pl., 4. p. 467.; N. Du Ham., 2. p. 197.

Synonymes. Charme, *Fr.*; Haynbuche, or Hainbuche, *Ger.*

Derivation. According to some, from *car*, wood, and *pix*, the head, *Celtic*; from the wood being used to make the yokes of oxen: and, according to others, from the Romans using the wood for making a sort of chariot, which they called *carpentum*, and which the Swedes still call karm. The French name, Charme, is evidently from the same origin. The English name of Hornbeam alludes to the horny texture of the wood; and the German one of Hainbuche, to the use of the wood for making groves in the geometric style of gardening.

Description, &c. Deciduous trees, mostly of the middle size; natives of Europe, Asia, and America; little valued either for their timber or ornamental effect; but one species valuable as a garden hedge plant.

♀ 1. *C. Be'tulus L.* The Birch, *or common*, Hornbeam.

Identification. Lin. Sp. Pl., 1416.; Willd. Sp. Pl., 4. p. 467.; Fl. Br., 1029.; Eng. Bot., t. 2032.; Hook. Scot., 274.; Fl. Dan., t. 1345.; N. Du Ham., 2. p. 198.; Eng. Fl., 4. p. 156.; Hook. Br. Fl., p. 405.; Mackay Fl. Hibern., p. 256.; Lindl. Synop., p. 240.

Synonymes. Cárpinus *Matth. Valgr.*, 1. p. 181., *Cam. Epit.*, 71., *Dod. Pempt.*, 841., *Hall. Hist.*, 2. p. 298. No. 1627.; *O'strya Bauh. Pin.*, 427., *Raii Syn.*, 451.; *O'rnus Trag. Hist.*, 1109.; *Fágus Bauh. Hist.*, 1. p. 2. 146. f.; *Bétulus Lob. Ic.*, 2. 190. f.
Engravings. Eng. Bot., t. 2032.; Fl. Dan., t. 1345.; Lob. Ic., 2. p. 190., f.; N. Du Ham., 2. t. 58.; and the plates of this tree in our last Volume.

Spec. Char., &c. Bracteas of the fruit flat, oblong, serrated, with two lateral lobes. (*Smith.*) A deciduous tree, a native of Britain, and of various parts of Europe, in magnitude and general character resembling the common beech.

Varieties.

♀ C. B. 2 *incisa* Lodd. Cat., 1836; *C.* v. *quercifòlia Desf.*; *C.* v. heterophýlla *Hort.*; has the leaves deeply cut. There are plants in the Horticultural Society's Garden, and in the arboretum of Messrs. Loddiges; one at Cheshunt, 6 years planted, and 17 ft. high; and one at Kinfauns Castle, 15 ft. high, with a trunk 2½ in. in diameter.

♀ C. B. 3 *variegàta* Lodd. Cat., 1836, has the leaves variegated.

Description, &c. The hornbeam, according to Sir J. E. Smith, is generally a "rigid tree of humble growth;" but one which "when standing by itself, and allowed to take its natural form, will make a much handsomer tree than most people are aware of." (*Eng. Fl.*, iv. p. 156.) Miller says that, when growing under favourable circumstances, it will attain the height of 60 ft. or 70 ft., with a tolerably straight trunk, and bushy head, particularly on cold stiff clay; but it is very seldom allowed to become a timber tree. Being ex-

1933



tremely patient of the knife, and forming excellent hedges, it is generally cut in when young; so that the few old trunks yet remaining in the country, of any size, are pollards. The trunk is generally flattened or irregular in its shape, being very rarely, if ever, round; and it seldom measures more than from 6 ft.



1934

to 9 ft. in circumference, even in the largest trees; it is also generally much thicker at the base than at 1 ft. or 2 ft. from the ground. The head is large, tufted, and consists of a confused mass of branches, among which it is almost impossible to trace the leader. The leaves somewhat resemble those of the elm, but are smoother: they are doubly serrated, pointed, plaited when young, and have numerous parallel, transverse, hairy ribs; their colour is a darkish green, changing to a russet brown in autumn; and they remain on the tree, like those of the beech, till spring. The buds are rather long and pointed. The flowers appear at the same time as the leaves. The male catkins are loose, scaly, of a yellowish colour, and about 2 in. or 3 in. long; the female catkins are much smaller, and, when young, are covered with close brownish scales, which gradually increase, and form "unequally 3-lobed, sharply serrated, veiny, dry, pale green bracteas, each enveloping an angular nut, scarcely bigger than a grain of barley." (*Smith.*) These nuts ripen in October, and fall with the capsules. The branches of the hornbeam, says Marshall, "are long, flexible, and crooked; yet in their general appearance they very much resemble those of the beech: indeed, there is so great a likeness between these two trees, especially in the shrubby underwood state, that it would be difficult to distinguish them at a first glance, were it not for that glossy varnish with which the leaves of the beech are strongly marked." (*Plant. and Rur. Orn.*, vol. ii. p. 51.) The wood is very tough and horny, and the bark smooth and whitish, or light grey spotted with white; and on old trees it is generally

1935



covered with a brownish moss. The tree is extremely patient of the knife; and the wood unites readily when two branches are bound together. The hornbeam never grows very fast, but still more slowly when it becomes old. In the neighbourhood of London, the rate of growth may be considered from 1 ft. to 18 in. a year for the first ten years, and the tree will attain its full size in between 50 and 60 years: its longevity may be considered as equal to that of the beech. There is a handsome tree in the grounds of the Duke of Devonshire's villa at Chiswick, of which a portrait will be found in our last Volume; and *figs*. 1933. to 1935. are portraits of trees at Studley Park. *Fig*. 1933. shows the natural form of the head of the tree, where it has room to expand. *Fig*. 1934. shows a beech on the right hand, which is 85 ft. high, and a hornbeam on the left, which is 73 ft. high. *Fig*. 1935. shows two hornbeams, one of which has a compound inosculated trunk, and is introduced to show that the hornbeam partakes of the liability of the beech to inosculate. The latter are between 50 ft. and 60 ft. high, with handsome well-shaped heads. The roots of the hornbeam are numerous, and not only extend far, but penetrate deeply into the soil; though the plant cannot be called tap-rooted.

Geography. The common hornbeam is indigenous in France, Germany, Italy, and throughout the whole of Central Europe; in Norway and Sweden, as far as 55° and 56°, but not to the north of Scania; in the south of Russia, and in Caucasus, Armenia, Asia Minor, and all Western Asia; but not in Africa. The general range of the hornbeam is in the temperate climates, as it seems alike averse from extreme heat and cold. It is a native of England and Ireland, and the south of Scotland. According to Watson, it is particularly abundant in Kent, Norfolk, Caernarvon, Chester, and Lancaster; (*Outlines*, &c., p. 255.); and Sir J. E. Smith informs us that it forms "a principal part of the ancient forests on the north and east sides of London; such as Epping, Finchley, &c." (*Eng. Flora*, iv. p. 156.) It is always found in cold, stiff, clayey, moist soils, where scarcely any other timber tree will grow; and in situations bleak, but seldom or never mountainous.

History, &c. The Greeks supposed the hornbeam to be a kind of maple, and called it Zugia, or the yoke tree, in common with the maple; from the use made of the wood of both trees for yokes for cattle. The Latins called it Carpinus; and under this name it is spoken of by Vitruvius, lib. ii. c. ix. Pliny classes it with the maples; though he adds that many naturalists suppose it to be a genus by itself. He says less about it than about any other forest tree; and only remarks that it will thrive equally well on the mountains and in the plains. Virgil does not mention it. Some of the old English writers considered it a kind of elm. Gerard calls it Betulus sive Carpinus; and his description of it is so curious, that we copy it below. He says that "it growes great, and very like unto the elme or wich-hasell tree; having a great body, the wood or timber whereof is better for arrowes and shafts, pulleyes for mils, and such like devices, than elme or wich-hasell; for, in time, it waxeth so hard, that the toughness and hardnes of it may be rather compared to horn than unto wood; and therefore it was called hornebeam or hard-beam. The leaves of it are like the elme, saving that they be tenderer:

among these hang certain triangled things, upon which are found knaps, or little buds of the bignesses of ciches, in which is contained the fruit or seed. The root is strong and thicke." He adds, that "it growes plentifully in Northamptonshire, and in Kent, by Gravesend; where it is commonly taken for a kinde of elme" (*Herball*, p. 1479.): and concludes by saying that he considers it as a kind of elm himself; and that it is called, in England, hornbeam, hard-beam, or yoke-elm, and in some places, witch-hazel. It was also sometimes called horse-beech. "This tree," says Parkinson, in his *Theatre of Plants*, "hath found about as many names as there have been authors that have written of it; but, by the judgment of the best, it is the Ostrya of Theophrastus, which he describeth so plainly in his 3d booke and 10th chapter, that it is a wonder so many learned men as have called it otherwise, should not better heede it; but, led by tradition or conceit, have rather taken it to be any other thing than what it is. Pliny (lib. iii. c. xxii.) describeth it; but maketh it like to Fraxinus, when he should rather have set Fagus; for it no way resembleth the ash, but very much the beeche. Tragus taketh it to be Ornus; and saith that he cannot agree to Ruellius, who said that Ornus was a species of Fraxinus. Matthiolus called it Carpinus. Dodonæus, in his Dutch book, maketh it his third kinde of elme, and doubteth if it be not the Ulmus sylvestris of Pliny. Lugdunensis giveth us the figure of it for Ulmus attinia; but Cordus or Dalechampius, I take it, first tooke it be Ostrya. Gesner, in *Hortis*, calleth it Fagus sepiaria; L'Obel, Betulus; and Clusius, Fagulus herbariorum." (*Parkinson's Theat. Bot.*, p. 1406.) Parkinson himself calls it Ostrya. The author of *An Old Thrift newly revived* classes the "hornebeame" among the British timber trees. It "doth much," he adds, "resemble the beech tree in qualitie; and desireth the same kind of ground, husbanding, and dressing, as the beech tree doth; but it is a more firme and solide kinde of wood." (p. 59.) The hornbeam was always a favourite tree for forming hedges and labyrinths; and, as these last appear to have been introduced at a very early period, it was, doubtless, among the first indigenous trees planted for garden purposes. In the *Retired Gardener*, and in James's *Gardening*, both of which are translations of French works published during the reign of Louis XIV., long details are given on the art of forming groves, labyrinths, alcoves, arcades, and "various other devices" of hornbeam; of which, the author adds, "Nature, of herself, hath provided enough for us to make what compartments we please with it in our gardens." (*Ret. Gard.*, ii. p. 740.) Evelyn speaks quite in raptures of the hornbeam hedges in the garden of London and Wise at Brompton; and of "the admirable espalier hedge in the long middle walk of the Luxembourg Garden at Paris (than which nothing is more graceful), planted of this tree; and so is that cradle, or close walk, with the perplexed canopy, which lately covered the seat in His Majesty's garden at Hampton Court." (*Hunt. Evel.*, i. p. 140.) With the decline of the geometric style of planting, the lofty hedges and alleys with clipped sides, of hornbeam, fell into disrepute; and the tree was chiefly used to form garden and nursery hedges for shelter and for coppice-wood. In the present day, the tree is little used for either of these purposes; beech, or some species of evergreen, being found to grow more rapidly as a hedge; and undergrowth of hornbeam only being planted in the worst soils.

Poetical Allusions. The hornbeam does not appear to have been mentioned by Virgil, or any of the other Latin poets. It is also very seldom alluded to by any of either the French or English poets of the middle ages. Rapin, in his Latin poem, entitled *The Gardens*, speaks of the use of this tree for labyrinths: —

"Let beauteous hornbeams one fair part adorn;
Another, cypresses with judgment shorn:
These mazy windings form a wilderness,
Which hornbeam hedges in trim neatness dress.
Along the alley sides their boughs expand:
Like verdant walls the firm espaliers stand;
And, while the eyes their various forms delight,
To private walks and shady bowers invite." Book ii.

Fawkes, also, mentions them in his *Bramham Park* : —

"Here hornbeam hedges regularly grow,
There hawthorn whitens, and wild roses blow."

Properties and Uses. The wood of the hornbeam is white, hard, heavy, tenacious, and very close-grained; but it will not take a good polish. According to Varennes de Fenille, it shrinks a great deal in drying, and loses considerably in its weight. Some German authors, however, deny that it loses either more bulk or more weight in drying than the oak. According to the table given in the *Dictionnaire des Eaux et Forêts*, it weighs, when green, 64 lb.; half-dry, 57 lb.; and quite dry, 51 lb. It is very seldom used in construction; partly because it is seldom found of proper dimensions, and partly because, when the tree attains a large size, the wood is apt to become shaky, like that of the chestnut. On this subject, Varennes de Fenille observes: "The trunk is rarely well shaped, being scarcely ever round; the arrangement of the fibres is singular, the annual layers never showing a regular circular line, like the layers of other trees, but being undulated and zigzag; and the transverse fibres, or medullary rays, stronger and wider apart than in most other trees. It is consequently very difficult to work: it is what the workmen call cross-grained, and is apt to rise in splinters under the workman's tool, peeling off in flakes, and rendering it very difficult to obtain a smooth section." These objections do not apply to the hornbeam in its young state. Its toughness and hardness (though the latter quality makes it difficult to work) render it excellent for all sorts of wheelwright's work, and other kinds of rural carpentry; particularly for the yokes of cattle, to which use the wood was applied (as we have already seen) by the Romans, and, since their time, in almost every country of which the tree is a native. It is particularly well adapted for mill-cogs, for which, according to Evelyn, "it excels either yew or crab." It is exceedingly strong; a piece 2 in. square, and 7 ft. 8 in. long, having supported 228 lb.; while a similar beam of ash broke under 200 lb.; one of birch, under 190 lb.; of oak, 185 lb.; of beech, 165 lb.; and of all other woods, very much less. Notwithstanding its powers of resistance, the hornbeam has very little flexibility; it having bent, before it broke, only 10°; while the ash bent 21°, the birch 19°, the oak 12°, &c. Linnæus observes that the wood is very white and tough, harder than hawthorn, and capable of supporting great weights.

As Fuel, the wood of the hornbeam should be placed in the highest rank. In France, it is preferred to every other for apartments, as it lights easily, and makes a bright flame, which burns equally, continues a long time, and gives out abundance of heat; but, though its value in this respect surpasses that of the beech in the proportion of 1655 to 1540, yet the shape of the logs of hornbeam is so irregular, that a cord of it, measured as they measure willows (see p. 1470.), is not worth more, in Paris, in proportion to a cord of beech, than 1486 to 1540. In England, the hornbeam is considered to make lasting firewood; and, according to Boutcher, it burns as clear as a candle. (*Treat.*, &c., p. 58.), Evelyn, also, says "it makes good firewood, where it burns like a candle; and was of old so employed: 'Carpinus tædas fissa facesque dabit.'" And Miller speaks of it as excellent fuel. Its charcoal is highly esteemed, and, in France and Switzerland, it is preferred to most others, not only for forges and for cooking by, but for making gunpowder; the workmen at the great gunpowder manufactory at Berne rarely using any other. The inner bark, according to Linnæus, is used for dyeing yellow. The leaves, when dried in the sun, are used in France as fodder; and, when wanted for use in winter, the young branches are cut off in the middle of summer, between the first and second growth, and strewed or spread out in some place which is completely sheltered from the rain, to dry, without the tree being in the slightest degree injured by the operation. (See *Dict. des Eaux et Forêts*, art. Charme.)

For a Nurse Plant, and for Hedges, the hornbeam is particularly well adapted. The real "excellency of the hornbeam," says Marshall, "lies in its

fitness for screen fences for sheltering gardens, nurseries, and young plantations from the severities of the winter season. It may be trained to almost any height; and, by keeping it trimmed on the sides, it becomes thick of branchlets, and, consequently, of leaves; which being by their nature retained upon the plant after they wither, a hornbeam hedge occasions a degree of shelter nearly equal to that given by a brick wall." (*Plant. and Rur. Orn.*, ii. p. 52.) Boutcher also recommends it as a nurse, for its hardiness; and because he does not know "any useful timber tree that defends itself so stoutly against the winds; so that, being of quick growth, and clad in its numerous leaves all the winter, it is certainly one of the fittest plants to nurse and rear up other valuable or delicate trees." (*Treat.*, &c., p. 58.) Hanbury says that horses and rabbits are so fond of it, that they will never bark other trees till the hornbeams are entirely destroyed. Evelyn recommends it to be planted in deer parks, as he says that deer will not touch it, and will not even rub their young horns against it.

Hornbeam Hedges. In France, a trained hornbeam hedge, or *charmille*, as it is called in that country, is formed in the following manner:—The ground is trenched one or two months beforehand. The plantation may be made either with plants 3 or 4 years old, or 6 or 7. The first method is the least expensive, and the most certain of success; but the latter soonest produces an effect. The plants, whether they are large or small, have their side shoots severely cut in; and they are planted in a single line, 6 in. or 8 in., or even 1 ft., apart, according to the height which it is intended the hedge should be. The plants are left to themselves for the first year. The second year, any straggling shoots are shortened, and the vacancies are filled up, if any plants have failed. The third year, if the plants were tolerably large when put in, the hedge may be regularly clipped, or sheared; but, if they were small, the clipping should not take place till the fifth year. In general, when the hedge is wanted of a considerable height, the clipping should be postponed longer than when it is wished to be kept low. With regard to the after-treatment, M. Bosc recommends clipping the hedge only once every year, at midsummer, for the same reasons which we have already given respecting clipping the box. (See p. 1340.) A *charmille*, or clipped hornbeam hedge, 8 ft. or 10 ft. high, should never be less than 8 in. or 1 ft. thick; and in some cases they may be 2 ft. thick. When the hedge becomes old, it is cut in to the stem, or completely down to the ground; but the best way is to remove the plants, and trench the ground to the depth of 3 ft. or 4 ft., filling up the trench with fresh earth, before replacing them with young ones. In Westphalia, and other parts of the north of Germany, Dr. Hunter, quoting from the German author Agricola, tells us that the hornbeam is in great repute as a hedge plant:— "When the German husbandman erects a fence of hornbeam, he throws up a parapet of earth, with a ditch on each side, and plants his sets (raised from layers) in such a manner as that every two plants may be brought to intersect each other in the form of a St. Andrew's cross. In that part where the two plants cross each other, he scrapes off the bark, and binds them closely together with straw. In consequence of this operation, the two plants consolidate in a sort of indissoluble knot, and push from thence horizontal slanting shoots, which form a living palisade, or chevaux de frise; so that such a protection may be called a rural fortification. These hedges, being pruned annually, and with discretion, will, in a few years, render the fence impenetrable in every part." (*Hunt. Evel.*, i. p. 141.) Layers are recommended by Agricola in preference to seedlings, because the former are supposed not to grow so high, and to be more bushy.

In geometric Gardening, the uses made of the hornbeam appear to have been very numerous. The principal was, to form high hedges, or palisades, for dividing the garden into compartments; which compartments were afterwards diversified "into the star, the goose-foot, and walks winding variously for the greater ornament of parks, labyrinths, and groves." (*Ret. Gard.*, ii. p. 741.) For the palisades, London and Wise direct the hornbeam plants to be

put into prepared ground, and treated as for the *charmille*; adding:—"That the hornbeam may grow to your liking, you must dig it four times a year, in March, May, July, and September. According as it comes up, you should keep it sheared, that it may grow in the form of an even palisade; and when it is of a good height, you make use of a hook. If the palisade runs very high, you should get a cart made on purpose; and the man who shears it gets up in it, and is drawn by one or two horses, according as the workman advances in his work." (*Ibid.*) A star consisted of five broad paths, with grass in the middle, and gravel on each side, cut through a wood of hornbeam, and radiating from a round grass-plot, surrounded by a ring of gravel. The wood was generally formed entirely of hornbeam; but sometimes the wood was of other trees, and only the avenues or alleys were lined by high hedges or palisades of hornbeam. The goose-foot may shortly be described as half a star; three walks or alleys, corresponding to the three large ribs in the foot of a web-footed fowl, radiating from one side of an oval or circle. "A labyrinth," says the author of the *Retired Gardener*, "is a place cut into several windings, set off with hornbeam, to divide them one from another. In great gardens, we often meet with them, and the most valuable are always those that wind most; as that of Versailles, the contrivance of which has been wonderfully liked by all that have seen it. The palisades of which labyrinths ought to be composed should be 10 ft., 12 ft., or 15 ft. high: some there are no higher than one can lean on, but they are not the finest. The walks of a labyrinth ought to be kept rolled, and the hornbeams in them sheared in the shape of half-moons." (*Ibid.*, p. 743.) "Bosquets, or groves, are so called from *bouquet*, a nosegay; and I believe that gardeners never meant anything else by giving this term to this compartment, which is a sort of green knot, formed by the branches and leaves of trees that compose it, placed in rows opposite to each other. A grove, in this sense, is a plot of ground more or less, as you think fit, enclosed in palisades of hornbeam; the middle of it filled with tall trees, as elms or the like, the tops of which make the tuft or plume. At the foot of these elms, which should grow along the palisades at regular distances, other little wild trees should be planted; and the tuft that will by this means be found in the inside will resemble that of a copse. There are several ways of drawing out these groves; some in regular forms, the plots being answerable to one another; and some in irregular, or the meer effect of fancy." (*Ibid.*, p. 744.) The paths in these groves were of gravel, well rolled, and kept very smooth; or of grass, well rolled, and closely shaven, "after the manner of green plots." The author of the *Retired Gardener* then adds: "I have named a great many sorts of compartments in which hornbeam is made use of; yet, methinks, none of them look so beautiful and magnificent as a gallery with arches." He then gives long details for executing this work; but what we have already extracted will suffice to give an idea of the use that was made of the hornbeam in geometric gardening.

Soil and Situation. The hornbeam will succeed in any soil not too warm and dry. It is naturally found on cold, hard, clayey soils, in exposed situations; but it attains its largest dimensions on plains, in loams, or clays that are not too rich. On chalk it will not thrive, in which respect it is directly the reverse of the beech.

Propagation and Culture. The seeds of the hornbeam ripen in October; and they are produced freely in England, but seldom in Scotland; the bunches, or cones, as they are called, which contain them, should be gathered by hand, when the nuts are ready to drop out; or they may be left on the tree till they drop; when, though a part of the seed will have fallen out, there will, in all probability, be enough left for future use, the tree being at present but very sparingly propagated in Europe. The nuts separate readily from their envelopes; and, if they are sown immediately, many of them will come up the following spring, and all of them the second spring. If they are preserved in dry sand, or in their husks, and sown the following spring, they will come up a year afterwards: the usual covering is ½ in. The plants may remain in the seed-

bed for two years; after which they may be planted into nursery lines, and undergo the usual routine treatment. The varieties are usually propagated by layers; and, according to Sang, the species was formerly propagated in this manner in large quantities; but, the plants so raised never arriving at great stature as timber trees, the hornbeam came to be considered more as a shrub than as a forest tree, and its planting was neglected, except for hedges. It is now, however, never propagated otherwise than by seeds.

Accidents, Diseases, Insects, and parasitic Plants. The hornbeam, from the toughness of its branches, and the tenacity with which its roots take hold of the soil, is scarcely ever injured by high winds; it is, however, very liable to be barked, and sometimes entirely destroyed, by mice, when the seedling plants first appear above the ground; and afterwards, till the tree is five or six years old, by hares and rabbits, neither of which will touch any other kind of tree in the same plantation, till they have stripped the hornbeam of every particle of its bark within their reach. It is liable to few diseases; but, when pruned or otherwise wounded in spring, it bleeds freely; sometimes, also, a kind of gum, in filaments, oozes out of the fissures of the bark. This genus is reddish, easily dissolved in spirits of wine, and analogous to lac. (See *Dict. des Eaux et Forêts*, &c.) The hornbeam does not appear to be much subject to the attacks of insects. *Hybérnia prosapiària, *Hírnera pennària, †Geómetra carpiniària, *Campæ'a margaritàta, Cloríssa putatària, are lepidopterous insects, which, in the larva state, either entirely or partially subsist upon the leaves. Cicònes cárpini is a small beetle found under the bark; Cóccus cárpini is found upon the stems, with the ordinary habits of the scale insects; and one of the saw-flies, Tenthrèdo cárpini, is thus named from its feeding upon this tree. The fungi that are found on the hornbeam are: Polýporus adústus *Willd.* var. carpíneus; Sphæ'ria decípiens *Dec.*; and Stilbóspora mágna *Berk.*, syn. S. Cárpini *Sow.*, t. 376., and fig. 16613. in the *Encyclopædia of Plants*, singular for the large tendrils which are formed by the oozing sporidia. Sphæ'ria fimbriàta *Pers.* and Sphæ'ria carpínea *Fr.* on the leaves, and S. Cárpini *Pers.* on the twigs, have not yet been observed in this country; but there is little doubt that they will reward the research of some botanist, in countries where the hornbeam is prevalent.

Statistics. Recorded Trees. Miller speaks of some hornbeams that he had seen in woods, 70 ft. high; but he does not give their circumference. Marsham mentions a hornbeam in Lord Petre's park at Writtle, in Essex, which, in 1764, measured, at 5 ft. from the ground, above 12 ft. in circumference. (*Bath Soc. Pap.*, i. p. 66.) Evelyn mentions the hedges at Hampton Court as being from 15 ft. to 20 ft. high. Dr. Walker, in his *Essays*, &c., mentions a hornbeam at Bargally (see p. 95.) which measured, in 1780, 6 ft. 2 in. in circumference, had 20 ft. of clear trunk, and was 70 ft. high. In France, the hornbeam is so generally used for garden hedges, that there does not appear to be any large old trees; but Evelyn informs us that, in Germany, it was formerly the custom to plant a clump of these trees "before the entries of most of the great towns; to which they apply timber frames for the people to sit and solace in. Scamozzi, the architect, says that in his time he found one whose branches extended 70 ft. in breadth: this was at Vuimfen, near the Necker, belonging to the Duke of Wirtemberg." (*Hunt. Evel.*, i. p. 144.)

Existing Trees of Cárpinus Bétulus. South of London: in Devonshire, at Endsleigh Cottage, 12 years planted, it is 30 ft. high, the diameter of the trunk 1 ft., and of the head 10 ft.; in Dorsetshire, at Melbury Park, 60 years planted, it is 72 ft. high, girt of trunk 7 ft., and diameter of the head 60 ft.; in Hampshire, at Alresford, 81 years planted, it is 66 ft. high, the diameter of the trunk 2 ft., and of the head 31 ft. North of London: in Denbighshire, at Llanbede Hall, 50 years planted, it is 56 ft. high, girt of the trunk 8 ft. 4 in., and diameter of the head 36 ft.; in Lancashire, at Latham House, 60 years planted, it is 48 ft. high, diameter of trunk 2 ft. 6 in., and that of the space covered by the branches 51 ft.; in Northamptonshire, at Wakefield Lodge, 15 years planted, it is 22 ft. high, the diameter of the trunk 5 in., and of the head 8 ft.; in Oxfordshire, in the Oxford Botanic Garden, 40 years planted, it is 25 ft. high, the diameter of the trunk 1 ft., and of the head 20 ft.; in Pembrokeshire, at Stackpole Court, 50 years planted, it is 53 ft. high, the diameter of the trunk 2 ft. 6 in., and of the head 50 ft.; in Shropshire, at Willy Park, 9 years planted, it is 25 ft. high; in Suffolk, at Finborough Hall, 60 years planted, it is 80 ft. high, the diameter of the trunk 2 ft. 3 in., and of the head 40 ft.; in Warwickshire, at Combe Abbey, 60 years planted, it is 42 ft. high, the diameter of the trunk 2 ft., and of the head 42 ft.: in Worcestershire, at Hadzor House, it is 33 ft. high, with a trunk 5 ft. 4 in. in girt; at Croome, 20 years planted, it is 30 ft. high, the diameter of the trunk 10 in., and of the head 15 ft.: in Yorkshire, in Studley Park, there are several trees from 50 ft. to 60 ft. high, three of which have been already figured.—In Scotland, near Edinburgh, at Hopetoun House, it is 40 ft. high, the diameter of trunk 1 ft. 10 in., and of the head 35 ft. South of Edinburgh: in the Stewartry of Kirkcudbright, at St. Mary's Isle, it is 48 ft. high, the diameter of the trunk 3 ft., and of the head 47 ft.; in Haddingtonshire, at Tynningham, diameter of the trunk 1 ft. 10 in., and that of the head 36 ft. North of Edinburgh: in Argyllshire, at Toward Castle, 15 years planted, it is 20 ft. high, diameter of trunk 6 in.; in Banffshire, at Gordon Castle, it is 54 ft. high, diameter of trunk 2 ft. 9 in., and of the head 30 ft.; in Clackmannanshire, in the garden of the Dollar Institution, 12 years planted, it is 30 ft. high; in Perthshire, at Taymouth, 40 years planted, it is 60 ft. high, diameter of trunk 8 in., and of head 30 ft.; in Renfrewshire, at Polloc, it was in 1836 6 ft. 6 in. in circum-

ference at 5 ft. from the ground, having increased 18 in. from 1812, when it measured 5 ft. in girt.—In Ireland, at Cypress Grove, it is 20 ft. high, diameter of trunk 2 ft. 8 in. and of the head 100 ft.; in King's County, at Charleville Forest, 8 years planted, it is 18 ft. high; in Fermanagh, at Florence Court, 35 years planted, it is 40 ft. high; in Galway, at Cool, it is 36 ft. high, diameter of trunk 1 ft. 3 in., and of the head 20 ft.; in Sligo, at Mackree Castle, it is 62 ft. high, diameter of the trunk 3 ft., and of the head 48 ft.; in the county Tyrone, 60 years planted, it is 50 ft. high, girt of trunk 6 ft., and the diameter of head 40 ft.—In France, near Nantes, 100 years old, it is 90 ft. high, with a trunk 8 ft. in circumference.—In Belgium, in the wood belonging to the villa of M. Meulemeester, near Ghent, is a serpentine walk about 300 ft. long, covered with hornbeam trained to a vaulted treillage. This leads to an artificial cave, which is paved with the metatarsal bones of sheep. We afterwards come to Pan's Theatre, this is wholly formed of hornbeam trees and bushes, which the shears have curiously tortured into the appearance of a stage with side scenes, and of front and side boxes, and parterre, or pit. (*Neill Hort. Tour.*, p. 56.)—In Hanover, in the Göttingen Botanic Garden, 20 years planted, it is 20 ft. high.—In Bavaria, in the Botanic Garden at Munich, 24 years old, it is 18 ft. high.—In Austria, at Vienna, in the University Botanic Garden, 40 years old, it is 48 ft. high, diameter of the trunk 1 ft. 3 in., and of the head 30 ft.; at Laxenburg, 60 years planted, it is 38 ft. high, diameter of the trunk 1 ft. 1 in., and of the head 12 ft.; at Kopenzel, 40 years planted, it is 30 ft. high, the diameter of the trunk 6 in., and of the head 18 ft.; in the garden of Baron Loudon, 20 years old, it is 25 ft. high, diameter of trunk 1 ft. 2 in., and of head 16 ft.; and at Brück on the Leytha, 60 years old, it is 48 ft. high, diameter of the trunk 2 ft., and of the head 39 ft.—In Prussia, near Berlin, at Sans Souci, 35 years old, it is 36 ft. high, diameter of trunk 1 ft. 4 in., and of the head 15 ft.—In Sweden, at Lund, in the Botanic Garden, it is 48 ft. high, diameter of the trunk 2 ft., and of the space covered by the branches 38 ft.—In Italy, in Lombardy, at Monza, 40 years old, it is 45 ft. high, the diameter of the trunk 1 ft. 3 in., and of the head 30 ft. The var. incisa, 24 years planted, is 14 ft. high.

✝ 2. *C.* (*B.*) AMERICA'NA *Michx.* The American Hornbeam.

Identification. Michx. Amer., 2. p. 201.; Willd. Sp. Pl., 4. p. 468.; Pursh Fl. Amer. Sept., p. 623.; Dend. Brit., t. 157.
Synonyme. C. virginiàna *Michx. Arb.*, t. 8.
Engravings. Dend. Brit., t. 157.; Michx. N. Amer. Syl., 3. t. 108.; and our *fig.* 1936.

Spec. Char., &c. Bracteas of the fruit 3-partite; middle division oblique, ovate-lanceolate, 1-toothed on one side. (*Willd.*) A low tree, generally from 12 ft. to 15 ft. high, but sometimes from 25 ft. 6 in. to 30 ft.; a native of North America. Introduced in 1812. The American hornbeam is smaller than that of Europe; as, though under peculiarly favourable circumstances it sometimes attains the height of 25 ft. or 30 ft., these instances are of rare occurrence, and its ordinary stature is that of a large shrub. The trunk is rather thick in proportion to its height, and frequently obliquely and irregularly fluted. The branches are numerous, short, and thickly set, so as to give the whole tree a dwarfish and stunted appearance. The bark is smooth, and spotted with white. The leaves are oval, acuminated, and finely dentated. The female flowers are collected in long, loose, pendulous catkins, like those of the European hornbeam; and, like that species, the bracteas expand, with the progress of the fruit, into a kind of leaf, furnished at the base with a small, hard, oval nut. The catkins often remain attached to the tree after the leaves have fallen. The tree prospers, in North America, in almost every soil and situation: it is found, according to Michaux, as far north as the provinces of Nova Scotia; and, according to Pursh, as far south as Florida. The wood is white, and exceedingly fine-grained and compact. According to Michaux, "the dimensions of the tree are so small as to render it useless even for fuel; but young trees are employed for hoops in the district of Maine, when better kinds cannot be procured." (*N. Amer. Syl.*, iii. p. 29.) It was introduced by Pursh, in 1812; and there are plants of it in some of the London nurseries. It is propagated by layers, and sometimes by imported seeds.



1936

Statistics. In Sussex, at West Dean, 15 years planted, it is 21 ft. high. In Staffordshire, at Trentham, 25 years planted, it is 35 ft. high, diameter of the trunk 1 ft., and of the head 27 ft. In Scotland, at Dalhousie Castle, 15 years planted, it is 14 ft. high. In France, near Paris, at Scéaux, 20 years old, it is 36 ft. high. In Italy, at Monza, 24 years planted, it is 24 ft. high, diameter of the trunk 8 in., and of the head 20 ft. Price of plants, in the London nurseries, 2*s.* each.

? ♠ 3. *C.* (*B.*) ORIENTA'LIS *Lam.* The Oriental Hornbeam.

Identification. Lam. Encyc., 1. p. 700.; Willd. Sp. Pl., 4. p. 468.; N. Du Ham., 2. p. 199.
Synonyme. C. duinénsis *Scop. Carn.*, t. 60.
Engravings. Scop. Carn., t. 60.; Dend. Brit., t. 98.; and our *fig.* 1937.

Spec. Char., &c. Bracteas of the fruit ovate, unequal at the base, undivided, somewhat angular, unequally serrated. (*Willd.*) A low tree or shrub, growing to the height of 12 ft.; a native of Asia Minor and the Levant. Introduced in 1739. The Eastern hornbeam is a dwarf tree, rarely rising above 10 ft. or 12 ft. in height. As it shoots out into numerous widely spreading, horizontal, irregular branches, it cannot be readily trained up with a straight clear trunk. The leaves are much smaller than those of the common hornbeam, and the branches grow closer together; so that it is even still better adapted for forming a clipped hedge than that species. It was introduced by Miller, in 1739; but, though it is very hardy, and easily propagated by layers, it has never been much cultivated in our nurseries. There are plants at Messrs. Loddiges's.



1937

Statistics. In Yorkshire, at Grimston, 14 years planted, it is 25 ft. high. In Austria, at Vienna, in Rosenthal's Nursery, 16 years planted, it is 12 ft. high. In Bavaria, at Munich, in the English garden, 14 years planted, it is 15 ft. high. In Italy, at Monza, 24 years old, it is 26 ft. high, diameter of the trunk 9 in., and of the head 20 ft. Plants, in the London nurseries, are 2*s.* 6*d.* each.

App. i. *Species or Varieties of Cárpinus not yet introduced into European Gardens.*

Cárpinus (B.) Carpinizza *Hort. Fl. Aust.*, 2., p. 696. Leaves crenately serrated; scales of the strobiles revolute, 3-cleft; the middle segment the longest, and quite entire. A native of the woods of Transylvania. The Transylvanians distinguished this sort from *C. Bétulus*, and call it Carpinizza.

C. *vimínea* Lindl., Wall. Pl. As. Rar., t. 106., Royle Illust., p. 341., and our *fig.* 1938., has the leaves ovate-lanceolate, much acuminated, doubly serrated; petioles and branchlets glabrous; bracteas fruit-bearing, ovate-oblong, laciniate at the base, somewhat entire at the apex, bluntish. (*Lindl. MSS.*) A native of the mountains of Nepal, in Sirmore and Kamaon; and, according to Royle, on Mussouree, at the height of 6500 ft. above the level of the sea; flowering and fruiting from January to April. "This fine tree is very like the common alder. Its wood is considered durable, and is used for ordinary building purposes by the natives of Nepal. The slender pendulous branches are frequently attacked by a sort of coccus, which produces numerous elevated tubercles, or warts. The structure of the nut resembles that of *C. Bétulus*, as described and figured by Gærtner, except in the following respect:—The cavity is filled with what appears to me an entire and homogeneous, fleshy, almost colourless substance, exceedingly like a perisperm; in which are suspended, towards the apex of the seed, two minute embryones. It is possible, that, notwithstanding the most careful and repeated examination, I may have mistaken the cotyledons of the ripe seed for a perisperm; but I have invariably seen two minute embryones lodged within the upper end of the fleshy substance which fills the nut." (*Wall. Pl. As. Rar.*, t. 106.) From the elevation at which this tree grows, it will probably be found hardy in British gardens.

1938



C. *faginea* Lindl., Wall. Pl. As. Rar., 2. p. 5., has the leaves ovate-oblong, acute, sharply serrated, and glabrous; petioles and branchlets downy; bracteas fruit-bearing, somewhat rhomboid, with large teeth, acute, reticulated. It is nearly allied to *C. orientàlis*, but differs in the form and margin of the leaf, and in the bracteas. (*Wall. Pl. As. Rar.*, 2. p. 5.)

GENUS V.

O'STRYA *Willd.* THE HOP HORNBEAM. *Lin. Syst.* Monœ'cia Polyándria.

Synonymes. Cárpinus *Lin. and others*; Hopfenbuche, *Ger.*
Derivation. From *ostryos*, a scale; in reference to the scaly catkins.

Description, &c. Low deciduous trees, natives of North America; propagated, in British nurseries, by layers, but sometimes by imported seeds.

♀ 1. *O.* VULGA'RIS *Willd.* The Hop Hornbeam.

Identification. Willd. Sp. Pl., 4. p. 469.
Synonymes. Cárpinus O'strya *Hort. Cliff.*, 447., *Roy Lugdb.*, 80., *Mill. Dict.*, No. 2., *Du Roy Harbk.*, 1. p. 127., *Lam. Encyc.*, 1. p. 700., *N. Du Ham.*, 2. p. 200.; O'strya carpinifòlia *Scop. Carn.*, No. 1191.; O'strya *Bauh. Pin.*, 427., *Du Ham. Arb.*, 5.; *O.* itálica, &c., *Michx. Gen.*, 223. t. 104. f. 1, 2.
Engravings. Michx. Gen., t. 104. f. 1, 2.; Dend. Brit., t. 143.; N. Du Ham., 2. t. 59.; our *fig.* 1939.; and the plate of this tree in our last Volume.

Spec. Char., &c. Strobiles ovate, pendulous. Leaves ovate, acute. Buds obtuse. (*Willd.*) A tree, from 30 ft. to 40 ft. in height; a native of Italy and the south of Europe. It was introduced into England before 1724, as it is mentioned in Furber's *Nursery Catalogue*, published in that year. The hop hornbeam, in its general appearance, bark, branches, and foliage, bears a great resemblance to the common hornbeam; but is at once distinguished from it by its catkins of female flowers. These consist of blunt scales, or bracteal appendages, which are close, and regularly imbricated, so as to form a cylindrical strobile, very like the catkin of the female hop; whereas in the common hornbeam the bracteas are open and spreading. The tree has a very handsome appearance when in fruit; and, in favourable situations, it will attain nearly as large a size as the common hornbeam. The finest specimen, probably, in England is in the Botanic Garden at Kew, of which a portrait is given in our last Volume. There are young trees in the Horticultural Society's Garden, and at Messrs. Loddiges's. The hop hornbeam is commonly grafted on the common hornbeam; but, as the growth of the former is more rapid than that of the latter, unless the graft is made immediately above the collar, the trunk of the scion becomes too large for that of the stock, and the tree is liable to be blown down, or broken over by the wind. Propagating by layers, or by seeds, is therefore a preferable mode.



1939

Statistics. In Scotland, at Bargally, was a tree which, in 1780, measured 4 ft. 1 in. in circumference, and was 60 ft. high. Dr. Walker adds that it was about 60 ft. high, healthy and vigorous, and had ripe seeds on it, in September, when he measured it. In France, in the Jardin des Plantes, 55 years old, it is 37 ft. high, the girt of the trunk 3 ft., and the diameter of the head 23 ft.; at Sceaux, 10 years planted, it is 20 ft. high; at Colombe, near Metz, 60 years old, it is 40 ft. high, the diameter of the trunk 1 ft. 1 in., and of the head 40 ft. In Germany, in Hanover, in the Göttingen Botanic Garden, 20 years planted, it is 20 ft. high, diameter of the trunk 8 in., and of the head 10 ft. In Cassel, at Wilhelmshoe, 15 years planted, it is 6 ft. high. In Austria, at Vienna, in the University Botanic Garden, 18 years old, it is 30 ft. high, the diameter of the trunk 5 in., and that of the head 12 ft.; in the garden of Baron Loudon, 30 years old, it is 18 ft. high, diameter of the trunk 14 in. and of the head 16 ft.; at Brück on the Leytha, 60 years old, it is 50 ft. high, the diameter of the trunk 2 ft., and of the head 36 ft. In Italy, in Lombardy, at Monza, 24 years old, it is 30 ft. high, the diameter of the trunk 1 ft., and of the head 24 ft. The price of plants, in the London nurseries, is 2*s.* each. Seeds are sometimes ripened in the Kew Gardens, and sometimes imported, and are sold at 1*s.* a packet.

♀ 2. *O.* (V.) VIRGI'NICA *Willd.* The Virginian Hop Hornbeam.

Identification. Willd. Sp. Pl., 4. p. 469.; Ait. Hort. Kew., 5. p. 302.

Synonymes. Cárpinus virginiàna *Abb. Ins.*, 2. p. 151., *Lam. Encyc.*, 1. p. 700., *Willd. Arb.*, 53., *Pluk. Alm.*, 7. t. 156. f. 1., *N. Du Ham.*, 2. p. 200.; Cárpinus O'strya virginiàna *Michx. Fl. Bor. Amer.*, 2. p. 202.; *C. O'strya Michx. N. Amer. Syl.*, 3. p. 30.; Iron Wood, Lever Wood, *Amer.*; Bois dur, *Illinois.*

Engravings. Abb. Ins., 2. t. 75.; Pluk. Alm., t. 156. f. 1.; ? N. Amer. Syl., 3. p. 109.; and our *fig.* 1940.

Spec. Char., &c. Strobiles ovate-oblong, erect. Leaves ovate-oblong, acuminate. Buds acute. (*Willd.*) A tree, from 15 ft. to 40 ft. high; a native of North America. Introduced in 1692. The Virginian hop hornbeam, or iron wood, generally forms a tree about 30 ft. high, growing more rapidly than *O.* vulgàris, and differing from that species, according to Willdenow and Pursh, chiefly in the position of its female catkins, which are upright, instead of being pendulous. The tree, according to Michaux, is easily known, in winter, by its smooth greyish bark, which is finely divided, and detached in strips of not more than a line in breadth. The wood is perfectly white, compact, fine-grained, and very heavy. The concentrical layers are closely compressed, and their number, in a trunk only 4 in. or 5 in. diameter, evinces the length of time which it requires for the tree to attain even this inconsiderable size. The leaves are alternate, oval-acuminate, and finely and unequally denticulated. "The small, hard, triangular seed is contained in a species of oval inflated bladder, covered, at the age of maturity, with a fine down, which causes a violent irritation of the skin if carelessly handled." (*Michx.*) The iron wood is distributed through all North America, from New Brunswick to Florida. It is, however, never found in masses, but is loosely disseminated through the forests, and only found in cool, fertile, shaded situations; and Michaux adds that he never saw it more vigorous than in Genessee, near Lake Erie and Lake Ontario. In consequence of the small size of the tree, the wood is but little used; though Michaux informs us that levers are made of it, with which the trees are raised that have been felled in clearing the ground, and transported to the pile where they are to be burned. "Near New York, brooms and scrubbing-brushes are made of it, by shredding the end of a stick of suitable dimensions." It was introduced into France by the elder Michaux; and some trees of it, planted on the estate of Du Hamel, at Monceau, have ripened seed, and sown themselves; so that there is now a young wood of it growing up. The Virginian hop hornbeam was introduced into England by Bishop Compton, in 1692; and there are plants of it in some collections, as, for example, in the Horticultural Society's Garden, and at Messrs. Loddiges's. The tree bears so close a resemblance to the European hop hornbeam, that, in all probability, it is not specifically different, though it appears to be somewhat more tender.



1940

Genus VI.



CO'RYLUS *L.* The Hazel. *Lin. Syst.* Monœ'cia Polyándria.

Identification. Lin. Gen., No. 1074.; Reich, 1172.; Schreb., 1450.; Gærtn., t. 89.; Tourn., 347.; Malp., 220, 221, 224.; Juss., 410.; N. Du Ham., 4. p. 17.; Willd. Sp. Pl., 4. p. 470.

Synonymes. Coudrier, *Fr.*; Haselnuss, *Ger.*

Derivation. According to some, from *korus*, a helmet; the fruit, with its involucre, appearing as if covered with a bonnet; and, according to others, from the Greek word *karuon*, a nut.

Description, &c. Deciduous shrubs or low trees, natives of Europe, Asia, and America; one of them, *C. Colúrna*, a timber tree of middle size.

■ 1. *C. Avella`na L.* The *common* Hazel Nut.

Identification. Hort. Cliff., 448.; Fl. Suec., 787. 873.; Mat. Med., 204.; Hort. Ups., 286.; Roy Lugdb., 81.; Dalib. Paris., 294.; Gmel. Sib., 1. p. 150.; Mill. Dict., No. 1.; Scop. Carn., No. 1192.; Du Roy Harbk., 1. p. 173.; Gmel. Ib., 1. No. 66.; Pollich Pall., No. 912.; Blackw., t. 293.; Kniph. Cent., 1. No. 19.; Hoffm. Germ., 339.; Roth Germ., 1. p. 409., 2. p. 490.; Willd. Sp. Pl., 4. p. 470.; Eng. Flor., 4. p. 157.; Eng. Bot., t. 723.; Brit. Fl., 1. p. 410.; Hook. Br. Fl., p. 405.; Mackay Fl. Hibern., p. 256.; Lindl. Synop., p. 240.; N. Du Ham., 4. p. 19.; Lodd. Cat., ed. 1836.

Engravings. Blackw., t. 293.; Eng. Bot., t. 723.; N. Du Ham., 4. t. 5.; and our *fig.* 1941., in which *a* is a sprig in blossom; *b*, one in fruit; *c*, the nut without its calyx; and *d*, the kernel

Synonymes. Coudrier Noisetier, *Fr.*; Haselstrauch, Nussbaum, *Ger.*; Avellano, Nocciolo, *Ital.*; Avellano, *Span.*

Derivation. *Avellàna* is derived from *Avellino*, see p. 2020. Hazel is from the Anglo-Saxon word *hæsil*, which signifies a head-dress. Noisette signifies a small nut; and Nussbaum, a nut tree.



1941

Spec. Char., &c. Stipules oblong-obtuse. Leaves roundish, cordate, pointed. Involucre of the fruit campanulate, rather spreading, torn at the margin. (*Willd.*) A shrub or low tree; a native of Europe and the east and west of Asia; growing to the height of 20 ft. and upwards; but commonly found in the character of a bush, as undergrowth in woods, especially of the oak.

Varieties. These are numerous; and they may be divided into two classes; viz., botanical or ornamental varieties, and those cultivated for their fruit.

A. *Botanical Varieties.*

■ C. A. 1 *sylvéstris* Ait. Hort. Kew., v. p. 303.; *C.* Avellàna *Svensk Bot.*, t. 139., *Eng. Bot.*, t. 723.; *C.* sylvéstris *Bauh. Pin.*, 418., *Ray*, 439., *Willd. Abbild.*, t. 151., and our *fig.* 1941. The common Hazel Nut, in a wild state.

■ C. A. 2 *pùmilus*; *C.* pùmilus *Lodd. Cat.*, ed. 1836; is rather dwarfer than the species.

■ C. A. 3 *heterophýlla*; *C.* heterophýlla *Lodd. Cat.*, ed. 1836; *C.* laciniàta *Hort.*; *C.* urticifòlia *Hort.*; *the various*, or nettle, *leaved*, *Hazel*; has the leaves variously cut, and thickly covered with hairs.

■ C. A. 4 *purpùrea*; *C.* purpùrea *Lodd. Cat.*, ed. 1836; *C.* àtro-purpùrea *Hort.*; has the leaves of a dark red or purple, and is a very striking variety. If grafted standard high on *C.* Colúrna, this would make a most singular and beautiful small tree.

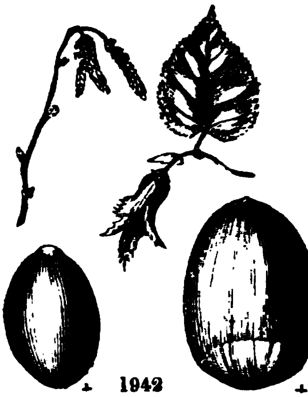
B. *Varieties cultivated for their Fruit.*

The cultivated hazels are of two kinds; viz., nuts and filberts. The former are distinguished by the shortness of their calyxes, or husks, and the latter by their length; but, in consequence of the numerous crosses between these two classes of varieties, the distinction can scarcely now be kept up. The term filbert, is supposed, according to some, to be a corruption of full beard, alluding to the husk; but the old English poet Gower assigns the name a different and more poetical origin; which is rendered plausible by the fact of the old English name being philberd.

> —— "Phillis
> Was shape into a nutte tree,
> That all men it might see;
> And after Phillis, Philberd
> This tree was cleped." *Confessio Amantis.*

In the *Horticultural Society's Catalogue of Fruits*, 31 sorts are enumerated; but the kinds best deserving of culture for their fruit, and also as ornamental shrubs or low trees, are considered by Mr. Thomson to be only 5, which we have distinguished among those hereafter enumerated by a star.

❧ * C. A. 5 *tubulòsa; C.* tubulòsa *Willd. Sp. Pl.*, iv. p. 470., *Abbild.*, t. 152., and our *fig.* 1942.; *C.* máxima *Mill. Dict.*, No. 2., *Du Roy Harbk.*, i. p. 176., *Lam. Illust.*, t. 780. f. *q.*; *C.* satìva *Bauh. Pin.*, 417.; *C. s.* rùbra *Ait. Hort. Kew.*, l. c.; red Filbert, *Hort. Soc. Cat.*, No. 18.; Langbartnuss, or Lambertsnuss, *Ger.*; Noisetier franc à Fruit rouge, *Poit. et Turp. Arb. Fruit.*, 11.; has a long tubular calyx, contracting so much beyond the apex of the fruit, as to prevent its falling out. It has a middle-sized ovate-oblong nut, the kernel of which is of excellent flavour for the table; and has a red pellicle, which was anciently used in medicine as a powerful astringent. Miller and Willdenow considered this as a species; the former stating that it comes true from seed.



1942

❧ * C. A. 6 *tubulòsa álba; C.* satìva álba *Ait. Hort. Kew.*, l. c.; *C. A.* álba *Lodd. Cat.*, ed. 1836; white Filbert, *Hort. Soc. Cat.*, No. 19.; weisse Langbartnuss, *Ger.*; only differs from the preceding variety in having the pellicle of its kernel white. It is mentioned by Miller (ed. 1759), as a variety of the preceding.

❧ * C. A. 7 *críspa* Encyc. of Plants; the frizzled Filbert, *Pom. Mag.*, t. 70., *Hort. Soc. Cat.*, No. 16.; and our *fig.* 1943. — A most remarkable variety, and well deserving of cultivation as an ornamental shrub, from the singular appearance it presents in its greatly laciniated calyx. The nuts are rather small; but they are produced early, and in great abundance.

❧ * C. A. 8 *ténuis* Lodd. Cat., ed. 1836; the thin-shelled, or Cosford, Nut, *Pom. Mag.*, t. 55., *Hort. Soc. Cat.*, No. 12.; has a nut with a thin shell, beautifully striated longitudinally. The kernel is of good quality, and the tree is a great bearer.



1943

❧ C. A. 9 *glomeràta* Bauh. Pin., 418., Ait. Hort. Kew., iv. p. 303.; *C. A.* glomeràta *Lodd. Cat.*, ed. 1836; Cluster Nut, *Hort. Soc. Cat.*, No. 6.; Noisetier à Grappes, *Fr.*; has the fruit produced in clusters.

❧ * C. A. 10 *barcelonénsis* Lodd. Cat., ed. 1836; *C.* satìva grándis *Bauh. Pin.*, 418., *Ait. Hort. Kew.*, v. p. 303.; *C. A.* grándis *Lodd. Cat.*, ed. 1836; the Cob Nut, syn. the Barcelona Nut, Downton large Nut, &c., *Hort. Soc. Cat.*, No. 8.; forms a tree of upright growth, with a short, ovate, slightly compressed nut, having a thick and very strong hard shell, well filled by the kernel. This variety was introduced by Ray, from Barcelona, before 1665.

❧ C. A. 11 *Lambérti; C.* Lambérti Lodd. Cat., ed. 1836; the Spanish Nut, syn. large Bond Nut, Lambert's Nut, Lambert's large Nut, Toker Nut, &c., *Hort. Soc. Cat.*, No. 29.; has a large oblong nut, with a very thick shell. The name of Lambert's Nut we suppose to be a corruption of the German word Langbartnuss; literally, the long-bearded nut, or filbert.

Other Varieties. In the selection made by Mr. Thomson for our *Suburban Gardener*, he recommends, besides those marked with a star in the above

list, the following: — *The great Cob Nut*, Hort. Soc. Cat., No. 9. The nut is roundish, with a thick shell, and one of the largest in cultivation.—*The Downton large square Nut*, Hort. Soc. Cat., No. 13. The fruit is large, short, and obtusely 4-sided.—*The Northampton Nut*, Hort. Soc. Cat., No. 25. Oblong fruit, very good.—*The Northamptonshire Prolific*, Hort. Soc. Cat., No. 27., an oblong nut, middle-sized, with a thick shell, and very early.

Description, &c. The common hazel nut is a large shrub, with numerous stems rising from the root; or a small bushy tree, with copious branches, which are hairy or glandular when young. The bark is ash-coloured, and sometimes cloven on the trunk, but of a clear bright brown, frequently spotted with white on the branches. The leaves are roundish, stalked, and alternate: they are of a darkish green, and slightly downy above; but paler, and more downy beneath. The male catkins are terminal and clustered; they are long and pendulous, greyish, and opening in early spring, before the appearance of the leaves. "The ovate scaly buds, containing the female flowers, become conspicuous, at the same time, by their tufts of crimson stigmas. The nuts, two or three from each bud, are sessile, roundish-ovate, and half-covered by the jagged outer calyx of their respective flowers, greatly enlarged and permanent." (*Smith.*) The rate of growth, under favourable circumstances, is from 1 ft. 6 in. to 2 ft. for the first two or three years after planting; after which, if trained to a single stem, the tree grows slower; attaining the height of 12 ft. in 10 years, and never growing much higher, unless drawn up by other trees. It grows remarkably well under the shade of other trees, but not under their drip. Its shoots are completed early in the season; and its leaves take their rich yellow autumnal tint early in the autumn, remaining on a long time, and only dropping off after a severe frost. Hence the great beauty of hazel coppices, especially when mixed with a few evergreens, such as the holly, the yew, and the box. Left to itself, it generally forms a huge bush, with numberless sucker-like branches proceeding from the root. When cut down to the ground, it stoles with great luxuriance, forming shoots from 3 ft. to 6 ft. in length the first season; and its duration, when so treated, exceeds a century. When treated as a tree with a single stem, it will probably live much longer. The largest nut trees which we recollect to have seen in England are in Eastwell Park, Kent; where, drawn up among thorns, crab trees, and common maples, they are upwards of 30 ft. high, with trunks 1 ft. in diameter at the surface of the ground.

Geography. The hazel is a native of all the temperate climates of Europe and Asia. In Great Britain, it is found from Cornwall to Sutherlandshire: in the north of England, it attains to the elevation of 1600 ft. (*Winch*); and it is found at about the same height on the hills of Forfarshire and Aberdeenshire. (*Watson's Outlines*, &c.) In Lochiel, Argyllshire, between 700 ft. and 800 ft. above the sea, there was, in 1832, a small wood of nut trees, producing abundance of fruit, and some of them with trunks of above 1 ft. in circumference. (*Ibid.*) The line of nuts on the Alps, between 45° and 46°, is stated by H. C. Watson to rise to 3798 ft., the snow line being 9080 ft. In Sweden, according to Professor Schouw, the hazel is found on the west side of Heligoland, in lat. 60°; while on the eastern side of the great mountain range it reaches to lat. 60—61°; and, though met with more to the northward, in the Gulf of Bothnia, yet it does not there go beyond 63°. In short, it is considered as not extending beyond the region of the beech. (See *Gard. Mag.*, xii. p. 60.) Evelyn observes that the hazel "affects cold, barren, dry, and sandy grounds; mountainous, and even rocky, soils produce them; they prosper where quarries of freestone lie underneath, as at Hazelbury in Wiltshire, Hazelingfield in Cambridgeshire, Hazelmere in Surrey, and other places; but more plentifully if the ground be somewhat moist, dankish, and mossy, as in the fresher bottoms and sides of hills, holts, and in hedgerows." (*Hunt. Evel.*, i. p. 215.) In Kent, where the hazel abounds in all the native woods, and where the cultivated varieties are to be found in most orchards,

the tree thrives best on a calcareous loam on chalk or rock; but in Scotland it is found on granite, basalt, and freestone.

History. The first mention that we find of the hazel tree is in the *Bible*; where, in Genesis (c. xxx. v. 37.), we are told that "Jacob took him rods of green poplar, and of the hazel and chestnut tree, and pilled white strakes in them, and made the white appear which was in the rods," in order to make the cattle under his care conceive streaked young. This has excited much discussion among commentators; and the general opinion seems to be, that luz (*Heb.*) is rightly translated hazel; though great doubt exists as to the tree there designated the chestnut; which most commentators suppose to be the plane. (See p. 1992.) The hazel nut was known both to the Greeks and Romans: the latter especially frequently mention it. The filbert is said to have been brought originally from Pontus; whence it was called by the Romans Nux Pontica. The hazel, or Nux Avellana, we are told by Virgil, in the *Georgics*, was considered by the Romans to be as injurious to the vines, on account of its spreading roots, as the goat was for its propensity to browse on the young shoots; and the keepers of the vineyards used to sacrifice the goat to Bacchus, and roast its entrails on hazel spits. Virgil also mentions that they used hazel twigs to bind their vines. The common hazel was called by the Romans Nux Avellana, from Avellino, a city in Naples; where, Swinburne tells us, in after times, nuts were cultivated in such abundance, as, in favourable seasons, to produce a profit of 11,250*l.* "I do not," says Evelyn, "confound the filbert Pontic, or filberd, distinguished by its beard, with our foresters, or bald hazel nuts, which, doubtless, we had from abroad, and bearing the names of Avelan, Avelin, as I find in some ancient records and deeds in my custody, where my ancestors' names were written Avelan, alias Evelin, generally." In the dark ages, the hazel was highly valued for its supposed divining powers. The following passage from Evelyn shows the popular belief in his time on this subject: — "Lastly, for riding-switches and divinatory rods, for the detecting and finding out of minerals (at least, if that tradition be no imposture); it is very wonderful, by whatever occult virtue, the forked stick (so cut, and skilfully held) becomes impregnated with those invisible steams and exhalations, as, by its spontaneous bending from a horizontal posture, to discover not only mines and subterraneous treasure, and springs of water, but criminals guilty of murder, &c.; made out so solemnly, and the effects thereof, by the attestation of magistrates, and divers other learned and credible persons (who have critically examined matters of fact), is certainly next to a miracle, and requires a strong faith. Let the curious, therefore, consult the philosophical treatise of Dr. Vallemont (*Physique Occult, ou Traité de la Baguet divinatore*), which will at least entertain them with a world of surprising things." The belief that certain gifted persons possessed the power of discovering hidden water or metal, by means of a divining-rod, is as old as the time of the Romans; but the virgula Mercurialis was not always made of hazel, or even of wood, but sometimes of brass or other metal. About the fifteenth and sixteenth centuries, the art was called rhabdomancy; and persons naturally gifted for practising it were called rhabdomists. The diviner took a hazel rod, which was either curved or forked, and held it by the two ends, so that its curvature was inclined outwards. If the person who held the rod possessed the power of rhabdomancy, and approached any metallic vein, or other magnetic substance, or came near them, a slow rotatory motion of the rod ensued in different directions, according to particular circumstances. (See *Physical and Historical Researches into Rhabdomancy*, &c.; *Elementi di Elettrometria Animale*, &c. &c.) In other cases, the rod was peeled, and then laid on the palm of the hand, with the but end of the twig on the pulse of the wrist; and the diviner moved slowly along, till the rod pointed to the desired place; the rhabdomist feeling, at the same time, either a violent acceleration or retardation of the pulse, and a sudden sensation of great heat or great cold. (See *Heinskingla, eller Suorro Sturleson's Nordländske Konuga Sagor.*, p. 1. c. vii.; *Martin and Rio's Disquisitorum Magicorum libri sex.*) Sir Walter Scott makes

Douster Swivel, in the *Antiquary*, use a hazel twig as a divining-rod; and several instances are mentioned, in different volumes of the *Gentleman's Magazine*, of divining-rods having been in use in England as late as the beginning of the eighteenth century. The following passage, quoted in the *Mirror* (vol. xxi. p. 58.), and said to have been found written in an old edition of Ovid's *Metamorphoses*, published in 1640, will show the manner in which the divining-rod was used about that period: — "The finding of gold which is under the earth, as of all other mines of metal, is almost miraculous. They cut up a ground hazel of a twelvemonth's growth, which divides above into a fork, holding the one branch in the right hand, and the other in the left, not held too slightly, or too strictly. When passing over a mine, or any other place where gold or silver is hidden, it will discover the same by bowing down violently; a common experiment in Germany, — not proceeding from any incantation, but a natural sympathy, as iron is attracted by the loadstone." The rods of Saracens and magicians, according to the *Dictionnaire des Eaux et Forêts*, were also of hazel. Numerous other virtues were anciently attributed to hazel rods. The ashes of the shells of its nuts, applied to the back of a child's head, were supposed to turn the child's eyes from grey to black; and Parkinson says, "Some doe hold that these nuts, and not walnuts, with figs and rue, was Mithridates' medicine, effectuall against poysons. The oyle of the nuts is effectuall for the same purposes." He also says that, "if a snake be stroke with an hasell wand, it doth sooner stunne it, than with any other strike; because it is so pliant, that it will winde closer about it; so that, being deprived of their motion, they must needs dye with paine and want; and it is no hard matter, in like manner, saith Tragus, to kill a mad dog that shall be strook with an hazel sticke, such as men use to walke or ride withall." (*Theat. of Plants*, p. 1416.) Evelyn says that the "venerable and sacred fabric of Glastonbury, founded by Joseph of Arimathea, is storied to have been first composed of a few hazel rods interwoven about a few stakes driven into the ground." The nut has been cultivated for its fruit since the time of the Romans; who, according to Sir William Temple, called Scotland Caledonia, from Cal-Dun, the hill of hazel. On the Continent, the hazel is grown in large quantities in Spain, and in some parts of Italy; and the fruit from the former country is celebrated throughout Europe. In Great Britain, it is most extensively cultivated in Kent; and, the produce being easily sent every where, and not suffering either by carriage or keeping, the tree is not much grown for its fruit in private gardens.

Poetical and legendary Allusions. Virgil alludes to the hazel in his *Georgics*, as we have before mentioned (p. 2020.); and again in his *Eclogues*, giving it the epithets of hard and dense. The hazel, however, was not nearly so great a favourite with the Latin poets as with those of the middle ages. The troubadours, and old French romance writers, have scarcely a song that does not allude to the hazel bush or hazel nut. Our own poets have also been lavish on the same theme. Cowley mentions that the hazel is the favourite resort of the squirrel: —

> ——— "Upon whose nutty top
> A squirrel sits, and wants no other shade
> Than what by his own spreading tail is made.
> He culls the soundest, dext'rously picks out
> The kernels sweet, and throws the shells about."

Thomson, in his *Spring*, describes birds as building

> ——— "Among the roots
> Of hazel, pendent o'er the plaintive stream;"

and, in his *Autumn*, the lover searching for "the clustering nuts" for his fair one; and, when he finds them,—

> ——— "Amid the secret shade;
> And where they burnish on the topmost bough,
> With active vigour crushes down the tree;
> Or shakes them ripe from the resigning husk,
> A glossy shower, and of an ardent brown." *Seasons.*

Gray, in his *Shepherd's Week*, alludes to the magic powers supposed to be possessed by the hazel nuts: —

> "Two hazel nuts I threw into the flame,
> And to each nut I gave a sweetheart's name.
> This, with the loudest bounce me sore amazed,
> That with a flame of brightest colour blazed.
> As blazed the nut, so may thy passion grow:
> For 't was thy nut that did so brightly glow."

From the custom of burning nuts in this manner on All-Hallows Eve, that day (the 31st of October) has received, in some parts of the country, the vulgar appellation of Nutcrack Night. Burns alludes to this custom in his *Halloween*: —

> "Amang the bonny winding banks
> Where Doon rins wimpling, clear,
> Where Bruce ance ruled the martial ranks,
> An' shook the Carrick spear,
> Some merry, friendly, countra folks
> Together did convene,
> To burn their nuts, an' pou their stocks,
> And haud their Halloween
> Fu' blythe that night."

The following pretty lines on this subject were published in a *Collection of Poems*, printed at Dublin in 1801: —

> "These glowing nuts are emblems true
> Of what in human life we view:
> The ill-matched couple fret and fume,
> And thus in strife themselves consume;
> Or, from each other wildly start,
> And with a noise for ever part.
> But see the happy, happy pair,
> Of genuine love and truth sincere;
> With mutual fondness, while they burn,
> Still to each other kindly turn;
> And, as the vital sparks decay,
> Together gently sink away;
> Till, life's fierce ordeal being past,
> Their mingled ashes rest at last."

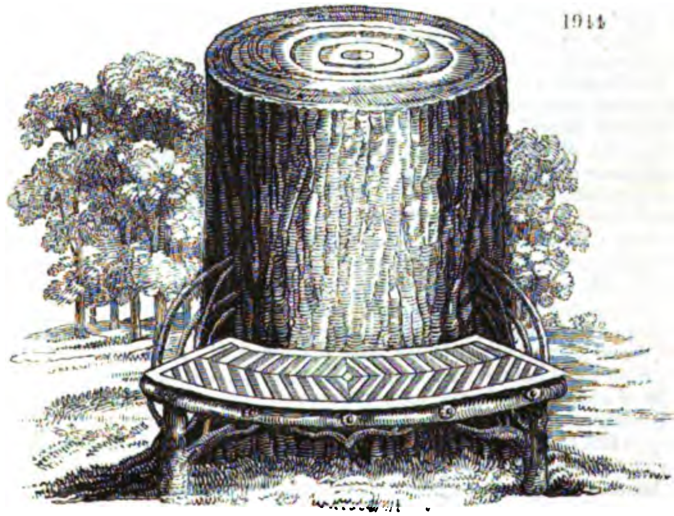
Many other quotations might be given, but we shall content ourselves with only one more, from Wordsworth: —

> —— "Among the woods
> And o'er the pathless rocks I forced my way;
> Until at length I came to one dear nook,
> Unvisited, where not a broken bough
> Droop'd with its wither'd leaves, ungracious sign
> Of devastation! But the hazels rose
> Tall and erect, with milk-white clusters hung,—
> A virgin scene! A little while I stood,
> Breathing with such suppression of the heart
> As joy delights in; and with wise restraint,
> Voluptuous, fearless of a rival, eyed
> The banquet. Then up I arose,
> And dragg'd to earth each branch and bough with crash,
> And merciless ravage; and the shady nook
> Of hazels, and the green and mossy bower,
> Deform'd and sullied, patiently gave up
> Their quiet being: but, unless I now
> Confound my present feelings with the past,
> Even then, when from the bower I turn'd away
> Exulting, rich beyond the wealth of kings,
> I felt a sense of pain when I beheld
> The silent trees, and the intruding sky."

Properties and Uses. The hazel, in a wild state, affords, by its numerous branches, protection to various small birds: its nuts afford food to the squirrels, and some other quadrupeds; to some of the larger birds; and to man in a wandering and half-civilised state; but there are a few insects that live on its leaves. Considered as a timber tree, the wood is never of a sufficient size for building purposes; but it is used in cabinet-making, and for various smaller and more delicate productions. It weighs, dry, 49 lb. per cubic foot. It is tender, pliant, of a whitish red colour, and of a close, even, and full grain; but it does not take a very bright polish. The roots, when they are of sufficient size, afford curiously veined pieces, which are used in veneering

cabinets, tea-chests, &c. The great use of the hazel, however, is for undergrowth. Being extremely tough and flexible, the root shoots are used for making crates, hurdles, hoops, wattles, walkingsticks, fishing-rods, whip handles, ties for faggots, springes to catch birds, and for fastening down the thatch, and for withs and bands for general purposes. A strong fence is made by driving stakes into the ground, and wattling the space between them with hazel rods. Evelyn tells us that out-houses, and even cottages, were sometimes made in this manner. In the county of Durham, particularly in the Vale of Derwent, hazel coppices are grown extensively for what are called corf rods, and hoops for coopers. The corf rods are from ½ in. to ¾ in. in diameter, and are used for making the baskets called corves, employed for drawing coals out of the pits. (*Bailey's Survey of Durham*, p. 187.) It is much grown, in Staffordshire, for crates for the potters; but, generally speaking, (though, if left a sufficient time, it will afford poles 20 ft. in length), it is found so inferior to other undergrowths, that Farey, in his excellent *Derbyshire Report*, advises the grubbing of it up, and replacing it with ash and oak. He also objects to it for hedgerows, on account of the temptation it offers to boys to break the hedges, in order to get at the nuts; and because the leaves and young shoots are said to be injurious to cattle if eaten by them, and to produce the disease called the red water. (*Gen. View*, &c., vol. ii. p. 91.) Hazel rods, cut as nearly as possible of the same size, and varnished, form an admirable material for constructing rustic garden seats, like that shown in *fig.* 1944.,

1944



and flower-baskets (*fig.* 1945.). An agreeable variety may be produced by using the rods alternately peeled, and with their bark on; or by mixing them with rods of some other kind of wood. Unpeeled hazel rods are, however, both handsomer and more durable than similar rods of any other kind of tree; and a variety may be produced in them by choosing them with bark of different shades; or even staining them with a decoction of logwood, or other dye, and then arranging them in a pattern, as shown in the arbour *fig.* 1946. Mr. Matthews, a carpenter residing at Frimley in Berkshire, has carried this idea still further, and, by an ingenious arrangement of different-coloured hazel rods, he produces a complete landscape, which, seen at a little distance, has a very striking effect. (See *Gard. Mag.*, vol. ix. p. 678.) Faggots of hazel are in great demand for heating ovens; and the charcoal, which is very light, is

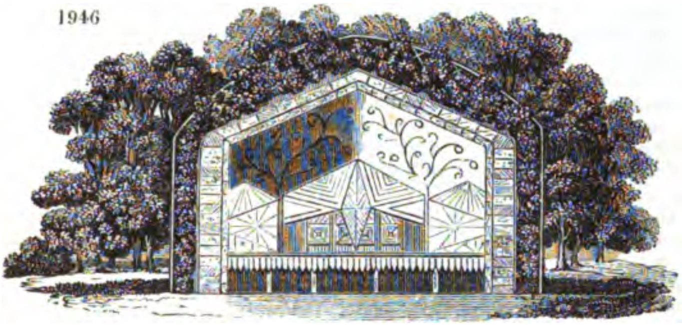


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considered excellent for gunpowder; it is also used for making crayons for drawing, being, for that purpose, charred in closed iron tubes. The principal use of the hazel in England, at the present time, is as a fruit tree; and a great quantity of the nuts, both of the wild and cultivated kinds, are sold in the English markets. "Besides those raised at home," says M'Culloch, "we import nuts from different parts of France, Portugal, and Spain, but principally from the latter. The Spanish nuts in the highest estimation, though sold under the name of Barcelona nuts, are not really shipped at that city, but at Tarragona, a little more to the south. Mr. Inglis says that the annual average export of nuts from Tarragona is from 25,000 to 30,000 bags, of four bags to the ton. The cost was, free on board, in autumn, 1830, 17*s.* 6*d.* a bag. (*Spain in* 1830, vol. ii. p. 362.) The entries of nuts for home consumption amount to from 100,000 to 125,000 bushels a year; the duty of 2*s.* a bushel producing from 10,000*l.* to 12,550*l.* clear." (*Dict. of Com.*, p. 853.) Mr. M'Culloch adds, "The kernels have a mild, farinaceous, oily taste, agreeable to most palates. A kind of chocolate has been prepared from them; and they have been sometimes made into bread. The expressed oil of hazel nuts is little inferior to that of almonds." Evelyn tells us that hazel nuts, though considered unwholesome to those who were asthmatic, were, in his "time, thought to be fattening; and, when full ripe, the filberts especially, if peeled in warm water, as they blanch almonds, make a pudding very little, if at all, inferior to what our ladies make of almonds." (vol. i. p. 217.) The oil made from hazel nuts, which is usually called nut oil, is best made in the middle of winter; as, if made sooner, the nut yields less oil; and, if later, it is apt to become rancid. It is extracted in the same manner as the walnut oil. (See p. 1429.). It is never made in England, and but rarely in France.

As an ornamental tree, the hazel, when trained to a single stem, forms a very handsome object for a lawn, near a winter's residence; because it not only retains its leaves a long time in autumn, after they have assumed a rich yellow colour, but, as soon as they drop, they discover the nearly full-grown male catkins, which often come into full flower at the end of October, and remain on the tree in that state throughout the winter; and, in days of bright sunshine in February and March, when slightly moved by the wind, they have a gay and most enlivening appearance. The length of time the leaves remain on the tree, and their rich yellow, render the hazel, as we have already observed (p. 2019.), one of the most ornamental of all deciduous shrubs as undergrowth; it ranking, in this respect, with the oak and the beech. The foliage of the birch and the willow, two of the commonest undergrowths in indigenous woods, is meagre, and drops off suddenly; while the leaves of the ash and the chestnut drop off early, when they have scarcely changed colour; and, hence, these trees, as undergrowths, are far inferior to the hazel in woods which form conspicuous features in the view from a mansion, or where orna-

1946



ment is at all taken into consideration. The purple-leaved hazel is a very handsome tree, and, with the common, may be very fitly associated in a group with the cut-leaved hazel; and, as an evergreen to contrast with them, may be added Gárrya ellíptica, the male catkins of which are often nearly 1 ft. in length, and appear at the same time, and continue as long, as those of the hazel. In many parts of France, *bosquets*, or small groves, and also arbours and covered walks, of the hazel are often found near old châteaux; and the same practice appears to have been followed in this country, if we may judge from the remains of covered nut walks yet existing in some old gardens. In shrubberies, the hazel gives rise to many interesting associations in the minds of those who have been brought up in nut countries. The writer of the article on Córylus, in the *Nouveau Du Hamel*, is eloquent in praise of the hazel on this account; and Sir Thomas Dick Lauder says: " The hazel, besides making up a prominent part of many a grove in the happiest manner, and tufting and fringing the sides of many a ravine, often presents us with very picturesque stems and ramifications. Then, when we think of the lovely scenes into which the careless steps of our youth have been led in search of its nuts, when autumn had begun to brown the points of their clusters, we are bound to it by threads of the most delightful associations, with those beloved ones, who were the companions of such idle, but happy days." (*For. Scen.*, i. p. 197.)

Soil and Situation. The hazel, according to Cobbett, " grows best upon what is called a hazel mould; that is to say, mould of a reddish brown: but it will grow almost any where, from a chalk or gravel, to a cold and wet clay; but the rods are durable in proportion to the dryness of the ground on which the hazel grows, and they are particularly good where the bottom is chalk." (*Woodlands*, § 283.) The situation most favourable is on the sides of hills, for it will not thrive in a soil where water is stagnant; though, like all trees and shrubs that grow in dense masses, it requires a great deal of moisture; and, indeed, it will always keep the ground moist under it by the denseness of its shade.

Propagation and Culture. The species is propagated by nuts, which, from the common wild filbert, are, in plentiful years, from 20*s*. to 30*s*. a sack of three bushels. These may be dried in the sun, and preserved in a dry loft, covered with straw, or in sand, till the following February; when they may be sown, and treated in the same manner as mast or chestnuts. After remaining in the seed-bed two years, they may be transplanted into nursery lines; and in one or two years more they will be fit for removal to their final situation. Where a hazel copse is to be formed, the nuts may be sown in drills, on ploughed ground, early in spring, and a crop of oats taken the first year; but this method cannot be recommended, as the nut, when young, is, as Cobbett observes, as tender as a radish, and easily injured by weeds. Plantations, therefore, are best made by planting; and the plants may be set in rows at 5 ft.

distance, and at 5 ft. apart in the row; the plants in one row alternating with openings in the other. When an oak wood with hazel coppice is to be formed, the mode of proceeding has been already given (p. 1802.). Hazel coppice, for the ordinary purposes of hurdle wood, hethers or wattles, crate-ware, hoops, &c., is generally cut every seven or eight years. The hurdles are sometimes manufactured on the spot; and, the other articles being selected, the remaining shoots and branches are made up into faggots.

The varieties, whether botanical, or valued for their fruits, are propagated by layers; though the purple hazel, being as yet rare, might be budded or grafted.

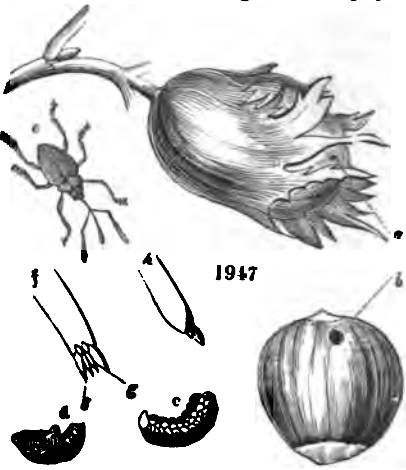
The hazel, as a fruit tree, is most commonly propagated by suckers, more especially in the neighbourhood of Maidstone, where the nuts are grown to greater perfection than any where else in England. Plantations are generally made in autumn, in soil which has been well trenched and manured. The plants are placed in rows, at from 10 ft. to 20 ft. distance from each other, and at 10 ft. apart in the row; while between the rows hops are frequently grown for a few years; but, after the filberts have attained a sufficient size to nearly cover the ground, the hops are destroyed. Filberts are also frequently planted in rows, in the intervals between larger fruit trees, such as apples, pears, cherries, &c.; but, though they grow very well in such situations, yet, from being shaded, and sometimes partially under the drip of the larger trees, they seldom, if ever, bear so well as in plantations by themselves. The principal art in the culture of the filbert, as a fruit tree, consists in training and pruning it properly, as the blossom is produced upon the sides and extremities of the upper young branches, and from small young shoots which proceed from the bases of side branches, cut off the preceding year. The tree requires to be kept remarkably open, in order that the main branches may produce young wood throughout the whole of their length. In the filbert orchards about Maidstone, the trees are trained with short stems like gooseberry bushes, and are formed into the shape of a punch-bowl, exceedingly thin of wood. Williamson, who has written on the subject in the *Horticultural Transactions*, advises "to plant the trees where they are to remain; to suffer them to grow without restraint for three or four years; and then to cut them down within a few inches of the ground. They will push five or six strong shoots, which, the second year after cutting down, are to be shortened one third; then place a small hoop within the branches, and fasten the shoots to it at equal distances. In the third year, a shoot will spring from each bud. These must be suffered to grow till the following autumn, or spring of the fourth year, when they are to be cut off nearly close to the original stem, and the leading shoot of the last year shortened two thirds. In the fifth year, several small shoots will arise from the bases of the side branches, which were cut off the preceding year: from these the fruit is to be expected; and the future object of the pruner must be directed to produce an annual supply of these, by cutting out all that have borne fruit. The leading shoot is to be shortened every year two thirds or more; and the whole height of the branches must not be suffered to exceed 6 ft. Every shoot that is left to produce fruit should also be tipped, which prevents the tree from being exhausted in making wood at the end of the branch. Observe, in pruning early in spring, to have a due supply of male blossoms, and to eradicate all suckers." Such is the Maidstone practice, "which has been long celebrated," by which 30 cwt. of nuts per acre have been grown on particular grounds, in particular years: but 20 cwt. is considered a large crop, and rather more than half that quantity the usual one, with a total failure three years out of five; so that the average produce is not more than 5 cwt. per acre. Williamson thinks "the failure happening so often may be owing to the excessive productiveness of the successful years, owing to the mode of pruning, by which the whole nourishment of the tree is expended in the production of fruit;" and he recommends having the trees rather more in a state of nature. (*Hort. Trans.*, vol. iv. p. 154.)

If, at any time, there should appear to be a deficiency of male catkins in a

filbert orchard, the defect can readily be supplied, when the female blossoms (which are easily known by being sessile and solitary, or in small clusters, and of a bright scarlet colour) are expanded, by collecting male blossoms from wild trees, or any others where they can be spared, and suspending them on the upper branches of the tree. The Rev. G. Swayne has proved the utility of this practice, both in his own case, and in that of some of his neighbours. (*Ibid.*, vol. v. p. 316.; and *Encyc. of Gard.*, ed. 1835, p. 944.) Rogers remarks that the kind of pruning which is found the best for the currant is also the best for the filbert. Filberts intended for long keeping, this author observes, "should remain on the tree till they are thoroughly ripe; which is easily known by their rich brown colour. They should be laid on a dry floor for a few days, and afterwards stored in jars of dry sand, where they will keep sound for a great length of time." (*Fruit Cultivator*, p. 190.) Filberts are always kept in the husk, and sold by the pound; while nuts are kept without the husk, and sold by the peck or bushel. The Barcelona nuts are imported in boxes, and kept in them till sold; while the English nuts are brought to market in sacks, and kept in them, or on the floors of lofts, or in dry cellars, till they are taken out to be exposed for sale. Filberts are brought to market, by the growers, in boxes; and are preserved, by the fruiterers, in layers in lofts, or in dry sand in cellars. After some time, the husks lose their colour, and appear black and mouldy; when they are slightly fumigated with sulphur, till their colour is restored. This operation is performed by putting them on trays, pierced with holes, and holding them over a chafing-dish of charcoal, on which a little powdered sulphur had been thrown when the charcoal was red-hot. The tray should be gently shaken, and the filberts spread on it very thinly, that the fumes of the sulphur may penetrate all round them.

Insects. The common nut is attacked by numerous species of insects, especially by the caterpillars of various moths and butterflies, which feed upon its leaves. Amongst these are to be mentioned, as partially (indicated by a star), or entirely (indicated by a dagger), feeding upon this tree, * Vanéss*a* C. álbum (or small tortoiseshell butterfly),* Staúropus fàgi (the lobster moth, so named from the remarkable form of the caterpillar, the fore legs of which are greatly elongated, and the front part of the body generally carried erect), * Notodónta *D*romedàrius, * E'ndromis versícolor (the rare glory of Kent moth), * A'glae taú (the tau emperor), † Dèmas córyli (the nut tree tussock), * Cósmia trapezìna, * Brèpha nòtha, * Hippárchu*s* *p*apilionàrius, * Cabèra pusària, * Harpályc*e* corylàta, * Lozotæ'nia corylàna, * Roxàn*a* arcuàna *L.* (*T*órtrix), † Semióscopis avellanélla (*T*ínea *H. C.*). The coleopterous insects are confined to the families *C*urculiónidæ and Chrysomélidæ. Amongst the former is especially to be noticed the Balanìnus nùcum *Germar* (*C*urcùlio nùcum *Linn.*), the larva of which is the white fleshy maggot so often found feeding upon the kernel of the nut. (See *fig.* 1947.) The perfect insect is a pretty beetle, about a quarter or a third of an inch long, with a very long and slender black horny beak, having the elbowed antennæ inserted near the middle. The body is, or, rather, the elytra, when shut, are, somewhat of a triangular form; and the general colour of the insect is fine greyish brown, with deeper shades, and irregularly waved bands. The female beetle deposits its eggs in the nut whilst in a young and immature state, the wound soon healing. This accounts for the larva being found within the shell, without any hole being seen by which it might have entered. It is said that the passage for the introduction of the egg is made by the female drilling through the rind with its rostrum. A single egg, of a brown colour, is introduced into each nut, from which the grub is hatched in about a fortnight; but it does not attain its full size until the whole of the interior of the nut is consumed; the kernel being the last part which it attacks. At this time the shell is found to be filled with black powder, which is nothing but the excrement of the larva. When full grown, the time for the fall of the nut is arrived; and the larva then, or sometimes while the nut remains on

the tree, eats a hole through the shell with its strong jaws, and pushes itself through the aperture thus made; although it appears too small to admit the body, which contracts itself to get through, and then falls to the ground, having no legs to support itself on the husk. Legs, however, would be an incumbrance to the insect, as it is born in the midst of its food; and when this is consumed its feeding time has terminated, and it is ready to make its way into the earth; where it forms an oval cell, and changes into a pupa; soon after which the perfect insect makes its appearance. In *fig.* 1947., *a* shows the wound made by the introduction of the egg into the young fruit; *b*, the hole in the mature fruit, by which the larva has made its exit; *c* is the larva; *d*, the pupa; and *e*, the perfect insect (these last three figures being represented about one third larger than the natural size). The tip of the rostrum, magnified, is shown at *f*; *g* being the jaws, and *h* a side view of a single jaw. In addition to this insect, Orchéstes avellànæ (one of the small flea weevils), Strophosòmus córyli, Apóderus córyli, *A*ttélabus *c*urculiónides, Tropíderes niveiróstris, Rhynchìtes Bácchus, and Polydrùsus argentàtus, are found in the nut; as well as the following, belonging to the Chrysomélidæ:—Chrysomèla coccínea and hemisphæ'rica; Clýthra lóngipes, 4-punctàta, tridentàta, and aurìta; Cryptocéphalus bipunctàtus, córdiger, córyli, and 6-punctàtus; and Híspa pectinicórnis. Amongst the Linnæan Hemíptera are: *C*ìmex córyli, avellànæ, and annulàtus *Linn*; *C*icàda aurìta, bicordàta, and córyli; A'phis córyli; and Cóccus córyli. Hemeròbius hírtus, amongst neuropterous insects; and Allántus córyli, amongst the saw-flies, complete the list of the chief species of insects which feed upon the common nut.



1947

Fungi on the Hazel. On the wood and fallen branches: *Agáricus* galericulàtus *Scop.*, *Sow.* t. 165., and fig. 15883. in the *Encyclopædia of Plants;* *A.* polygrámmus *Dec.*, syn. *A.* fistulòsus, *Bull.* t. 518., and fig. 15884. in the *Encyclopædia of Plants;* and *A.* striátulus *Pers.*, a minute resupinate species; Theléphora rugòsa *Pers.*, syn. T. corýlea *Pers.*, remarkable for its blood-stained hue, when rubbed or scratched; T. *A*vellànæ *Fr.*; Clavària Ardènia Sow. t. 215., and fig. 16171. in the *Encyclopædia of Plants; Pezìza* furfuràcea *Fr.*; Sphæ'ria fúsca *Pers.*; S. verrucæfórmis *Ehrh.*; S. decèdens; Demàtium gríseum *Fr.*; Tórula antennàta *Pers.* On the roots, *Agá*ricus radicàtus *Relh.* On the leaves: S. *A*vellànæ *Schmidt*, a highly curious species which has, in the present year, occurred abundantly in Northamptonshire, but appears not to have been found before, since its first detection by Schmidt; Sphæ'ria gnòmon *Tode; Erý*siphe guttàta *Schlecht.* On the nuts, *P*ezìza fructígena *Bull.*, already noticed under the beech, fig. 1900. p. 1974.

Commercial Statistics. The price of plants, in the London nurseries, is: one-year's seedlings, 10*s.* per thousand; two-years' seedlings, 15*s.* per thousand; transplanted, from 1 ft. to 2 ft. high, 30*s.* per thousand; transplanted, from 2 ft. to 3 ft. high, 50*s.* per thousand. Plants of the different varieties are 1*s.* each. Price of English nuts, in Covent Garden market, from 2*s.* to 3*s.* per peck; of Barcelona nuts, from 5*s.* to 6*s.* per peck; of English filberts, from 4*l.* 10*s.* to 5*l.* per 100 lb. Price of plants, at Bollwyller, of the varieties, from 2 francs to 5 francs each; at New York, the varieties are from 25 cents to 50 cents each.

⚘ 2. *C.* Colu'rna *L.* The *Constantinople* Hazel.

Identification. Hort. Cliff., 448.; Roy. Lugdb., 81.; Mill. Dict., No. 2.; Willd. Sp. Pl., 4. p. 472.; N. Du Ham., 4. p. 20.; Lodd. Cat., 1836.

Synonymes. C. byzantina *Herm. Lugdb.*, 91., *Seb. Mus.*, 1. t. 27.; *A*vellàna peregrina hùmilis *Bauh. Pin.*, 418.; *A.* pùmila byzantina *Clus. Hist.*, 1. p. 11.; *C.* arbòrea *Hort.*; le Noisetier de Bizance, *Fr.*; Byzantinische Haselnuss, *Ger.*

Engravings. Seb. Mus., 1. t. 27. f. 2.; Dend. Brit., t. 99.; our *fig.* 1948.; and the plates of this tree in our last Volume.

Spec. Char., &c. Stipules lanceolate, acuminate. Leaves roundish ovate, cordate. Involucre of the fruit double; the exterior many-partite, the interior 3-partite; divisions palmate. (*Willd.*) A tree, 50 ft. or 60 ft. high; a native of Turkey and Asia Minor. Introduced in 1665.

Varieties.

⚘ C. C. 2 *intermèdia*; *C.* intermèdia *Lodd. Cat.*, ed. 1836; is probably a hybrid between *C. C*olúrna and *C. A*vellàna.

⚘ C. C. 3 *arboréscens* Fisch., and our *fig.* 1949., differs from the species, chiefly in the calyx of the nut being cut into shreds.



1948

Description, &c. The Constantinople nut forms a handsome somewhat pyramidal tree, 50 ft. or 60 ft. high; with a whitish bark, which peels off in strips. The branches spread out horizontally; the leaves are more angular, and softer, than those of the common hazel; and the stipules are linear. The nuts are small, round, and almost covered with the calyx, which is double, and deeply laciniated, or fringed, with the points recurved. The tree grows rapidly, and with great vigour, in the climate of London. It was at first supposed to be a dwarf shrub, and is described as such in the old books relating to trees; but it was soon discovered to be a lofty tree. It is a native of Asia Minor and Turkey; but it bears the climate of both Paris and London without the slightest injury. Desfontaines tells us that Clusius first cultivated the *C*órylus *C*olúrna; and that it was sent to him from Constantinople in 1582 (*Hist. des Arbres*, ii. p. 540.); and Prof. Martyn tells us it was reintroduced four years afterwards by "David Ungnad Baron in Zorneck." It appears to have been first cultivated in England by Rea, a florist, who, in his *Flora*, published in 1665, says that he had then "many goodly plants of the filbeard of Constantinople." (p. 224.) It is also mentioned by Ray, the celebrated botanical author, in his *Historia Plantarum*, published in 1686, among "the rare trees and shrubs" which he saw a short time previously in the Palace Gardens at Fulham. (See p. 41.) Notwithstanding its beauty, and the ease with which it is cultivated, the Constantinople nut has never been much in demand in English gardens.



1949

It will grow in almost any soil, but does best in one similar to that adapted for the common hazel. It is easily propagated by seed, grafts, or layers. Grafting on the common hazel is, however, the most general way, as the nut often proves abortive, both in French and English gardens. The largest tree in the neighbourhood of London is that at Syon, of which a portrait is given in our last Volume. There are also large trees at Ham House, Purser's Cross, and in the grounds of Farnham Castle, which bear fruit most years. Price of plants, in the London nurseries, 1*s.* 6*d.* each; at Bollwyller, 50 cents; and at New York, 50 cents.

■ 3. *C.* ROSTRA'TA *Ait.* The beaked, *American, or Cuckold,* Hazel.

Identification. Ait. Hort. Kew., 3. p. 364.; ed. 2., 5. p. 303.; Willd. Sp. Pl., 4. p. 471.; Mich. Amer., 2. p. 201.; N. Du Ham., 4. p. 21.; Lodd. Cat., ed. 1836.
Synonymes. C. sylvéstris, &c., *Gron. Virg.*, 151.; C. cornùta *Hort.*

Spec. Char., &c. Stipules linear-lanceolate. Leaves ovate-oblong, acuminate. Involucre of the fruit tubular, campanulate, larger than the nut, partite; divisions inciso-dentate. (*Willd.*) *C.* rostràta is a bushy shrub seldom exceeding 4 ft. or 5 ft. in height, resembling the common European hazel, but distinguished from it by its fruit being covered with the calyx which is prolonged in the form of a long very hairy beak; and hence the name. The kernel is sweet, but not worthy of cultivation for the table. The plant is found, according to Pursh (ii. p. 635.), on mountains, from Canada to Carolina; but is not common on the plains, and rarely occurs so far south as Boston. The American hazel was introduced into England, in 1745, by Archibald Duke of Argyll, but has never been much cultivated. Plants, in the London nurseries, are 1*s.* each; at Bollwyller, 2 francs; and at New York, 25 cents.

■ 4. *C.* AMERICA'NA *Michx.* The American Hazel.

Identification. Michx. Amer., 2. p. 210.; Willd. Sp. Pl., 4. p. 471.; Lodd. Cat., ed. 1836.
Synonymes. C. am. hùmilis *Wang. Amer.*, 88. t. 29. f. 63.; Dwarf Cuckold Nut, wild Filbert, *Ame*
Engraving. Wang. Amer., 88. t. 29. f. 63.

Spec. Char., &c. Leaves roundish, cordate, acuminate. Involucre of the fruit roundish, campanulate, longer than the nut; limb spreading, dentately serrated. (*Willd.*) The American hazel is a shrub, growing, according to Pursh, to the height of from 4 ft. to 8 ft. It differs from *C.* rostràta about as much as the filbert from the European hazel. The calyx is larger than the included nut, the flavour of the kernel of which is said to be very fine. It is found in low shady woods from Canada to Florida. It was introduced, in 1798, by the Marchioness of Bute. Plants, in the London nurseries, are 2*s.* each; at Bollwyller, 1½ francs; and at New York, 25 cents.

App. i. *Species of* Córylus *not yet introduced.*

C. *ferox* Wall. Pl. As. Rar., t. 87., and our *fig.* 1950., in which *a* is the nut with its deeply laciniated calyx; *b* the nut; *c* the kernel; and *d* a longitudinal section of the nut, with the kernel enclosed. The leaves are oblong, and much pointed. Stipules linear-lanceolate. Nut compressed, and half the length of the villous, 2-parted, ragged, and spinous involucre. (*Wall.*) "A native of the top of the mountain Sheopur, in Nepal; flowering in September, and bearing fruit in December. A tree, 20 ft. high, with a trunk sometimes 2 ft. in circumference, and somewhat glabrous ash-coloured bark. Branches twiggy, smooth, cylindrical, brownish, dotted; the young ones silky. Buds conical-oblong, covered externally with soft down. Leaves 3 in. or 4 in. long, covered on both sides with adpressed down; dark green above; rough, and of a pale colour, beneath. The wood of this tree is light, compact, and of a pale tinge. The nut is small, and precisely like the common hazel nut in taste. The shell is exceedingly hard and thick." (*Wall. Pl. As. Rar.*, t. 87.) This species has not been yet introduced; but, from the elevation of its native habitat, it would doubtless prove hardy. From the laciniated calyx of this nut, it appears nearly allied to C. C. arborescens *Fisch.* (See p. 2029.)

1950



END OF THE THIRD VOLUME.

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